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Owner's Manual

Console Server Management Switch

Models: B096-016 / B096-048

Console Server with PowerAlert

Model: B092-016

Console Server

Models: B095-004-1E / B095-003-1E-M

TRIPP·LITE

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1. INTRODUCTION

This Manual

This User Manual is provided to help you get the most from your B096-016 / B096-048 Console Server Management Switch, B092-016 Console Server with PowerAlert or B095-004-1E / B095-003-1E-M Console Server product. These products are referred to generically in this manual as Console Servers.

Once configured, you will be able to use your Console Server to securely monitor, access and control the computers, networking devices, telecommunications equipment, power supplies and operating environment in your data center, branch office or communications room. This manual guides you in managing this infrastructure locally (at the rack side or across your operations or management LAN or through the local serial console port), and remotely (across the Internet, private network or via dial up).

FCC Information

This is an FCC Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures. This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

RoHS

This product is RoHS compliant.

User Notice

All information, documentation and specifications contained in this manual are subject to change without prior notification by the manufacturer. The manufacturer makes no representations or warranties, either expressed or implied, with respect to the contents hereof and specifically disclaims any warranties as to merchantability or fitness for any particular purpose. Any of the manufacturer's software described in this manual is sold or licensed `as is'. Should the programs prove defective following their purchase, the buyer (and not the manufacturer, its distributor, or its dealer), assumes the entire cost of all necessary servicing, repair and any incidental or consequential damages resulting from any defect in the software.

The manufacturer of this system is not responsible for any radio and/or TV interference caused by unauthorized modifications to this device. It is the responsibility of the user to correct such interference. The manufacturer is not responsible for any damage incurred in the operation of this system if the correct operational voltage setting was not selected prior to operation.

Please take care to follow the safety precautions below when installing and operating the Console Server:

- ***Do not remove the metal covers. There are no operator-serviceable components inside. Opening or removing the cover may expose you to dangerous voltage which may cause fire or electric shock. Refer all service to Tripp Lite qualified personnel***
- ***To avoid electric shock the power cord protective grounding conductor must be connected through to ground***
- ***Always pull on the plug, not the cable, when disconnecting the power cord from the socket***
- ***Do not connect or disconnect the Console Server during an electrical storm***
- ***Also it is recommended you use a surge suppressor or UPS to protect the equipment from transients***

Manual Organization

This Owner's Manual covers all aspects of installation, configuration and operation and an overview of the information found in the manual is provided below.

1. Introduction	An overview of the features of the Console Server and information on this manual.
2. Installation	Details physical installation of the Console Server and the interconnection of controlled devices.
3. System Configuration	Describes the initial installation and configuration using the Management Console of the Console Server on the network and the services that will be supported.
4. Serial and Network	Covers configuring serial ports and connected network hosts, and setting up Users and Groups.
5. Failover and OoB dial-in	Describes setting up the high-availability access features of the Console Server.
6. Secure Tunneling (SDT)	Covers secure remote access using SSH and configuring for RDP, VNC, HTTP, HTTPS, etc. access to network and serially connected devices.
7. Alerts and Logging	Explains the setting up of local and remote event/ data logs and triggering SNMP and email alerts.
8. Power & Environment	Management of USB, serial and network attached Power Distribution Units and UPS units including Network UPS Tool (NUT) operation and IPMI power control and EMD environmental sensor configuration.
9. Authentication	All access to the Console Server requires usernames and passwords which are locally or externally authenticated.

10. Nagios Integration	Setting Nagios central management with SDT extensions and configuring the Console Server as a distributed Nagios server.
11. System Management	Covers access to and configuration of services to be run on the Console Server.
12. Status Reports	View the status and logs of serial and network connected devices (ports, hosts, power and environment).
13. Management	Includes port controls and reports that can accessed by Users.
14. Basic Configuration	Command line installation and configuration using the config command.
15. Advanced Config	More advanced command line configuration activities where you will need to use Linux commands.
16. Thin Client	Configuration and use of the thin client and other applications (including Power Alert) embedded in the Console Server with PowerAlert (B092-016) product.

Types of Users

The Console Server supports two classes of users:

I. Administrative users: Those who will be authorized to configure and control the Console Server; and to access and control all the connected devices. These administrative users will be set up as members of the admin user group. Any user in this class is referred to generically in this manual as an Administrator. An Administrator can access and control the Console Server using the config utility, the Linux command line or the browser-based Management Console. By default the Administrator has access to all services and ports to control all the serial connected devices and network connected devices (hosts).

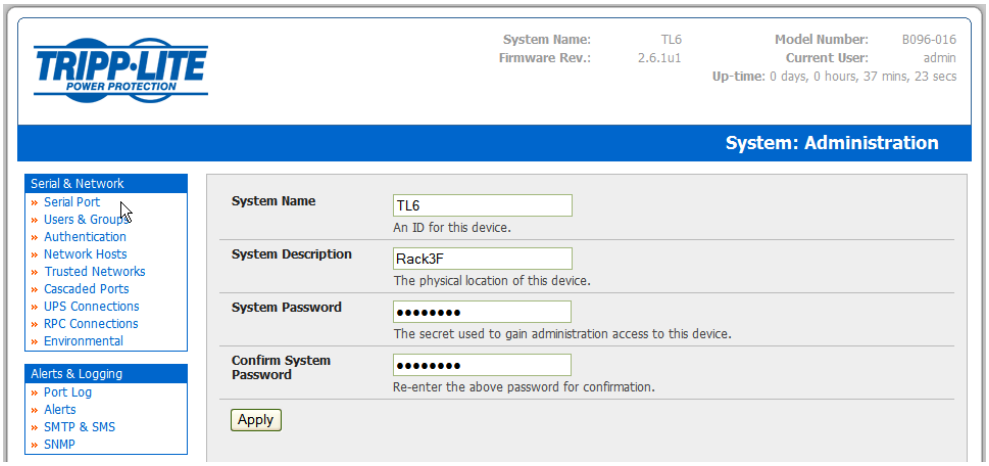
II. Users: Embraces those who have been set up by the Administrator with specific limits on their access and control authority. These users are set up as members of the users user group (or some other user groups the Administrator may have added). They are only authorized to perform specified controls on specific connected devices and are referred to as Users. These Users (when authorized) can access serial or network connected devices; and control these devices using the specified services (e.g. Telnet, HHTPS, RDP, IPMI, Serial over LAN, Power Control). An authorized User can also use the Management Console to access configured devices and review port logs.

In this manual, when the term user (lower case) is used, it is referring to both the above classes of users. This document also uses the term remote users to describe users who are not on the same LAN segment as the Console Server. These remote users may be Users, who are on the road connecting to managed devices over the public Internet, or it may be an Administrator in another office connecting to the Console Server itself over the enterprise VPN, or the remote user may be in the same room or the same office but connected on a separate VLAN to the Console Server.

Management Console

The Console Server Management Console runs in a browser. It provides a view of your Console Server Management Switch (B096-016/048), Console Server with PowerAlert (B092-016) or Console Server (B095-004/003) product and all the connected equipment. Administrators can use the Management

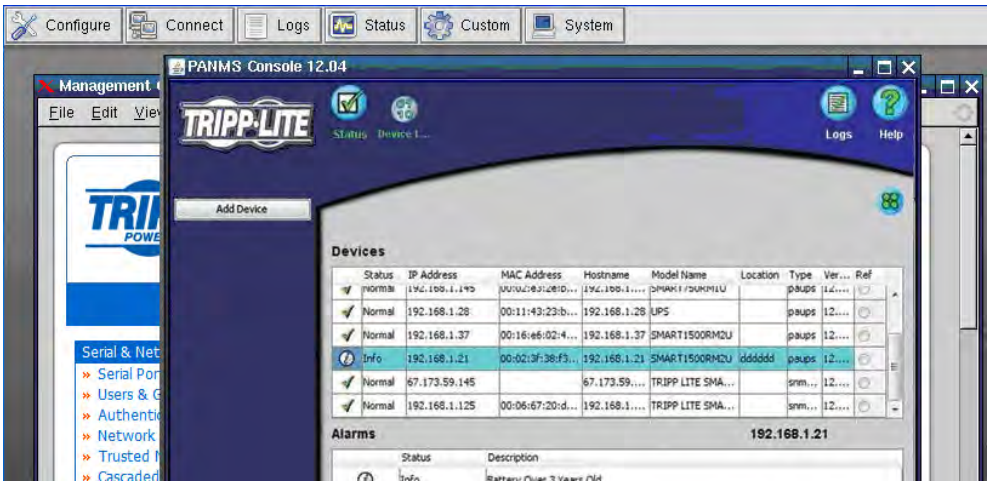
Console, either locally or from a remote location, to configure the Console Server, set up Users, configure the ports and connected hosts, and set up logging and alerts.



An authorized User can use the Management Console to access and control configured devices, review port logs, use the in-built java terminal to access serially attached consoles and control power to connected devices.

The Console Server runs an embedded Linux operating system. Experienced Linux and UNIX users may prefer to undertake configuration at the command line. As an Administrator you can get command line access by connecting through a terminal emulator or communications program to the console serial port; or by SSH or Telnet connecting to the Console Server over the LAN; or by connecting to the Console Server through an SSH tunnel using the SDTConnector.

The B092-016 Console Server also has PowerAlert software and a selection of thin clients embedded (RDP, Firefox etc). You will be able to use these consoles as well as the standard Management Console for access and control.



Manual Conventions

This manual uses different fonts and typefaces to show specific actions:

Note Text presented like this indicates issues which need to be noted.

Text presented like this highlights important issues and it is essential you read and take heed of these warnings.

- Text presented with an arrowhead indent indicates an action you should take as part of the procedure.

Bold text indicates text that you type, or the name of a screen object (e.g. a menu or button) on the Management Console.

Italic text is also used to indicate a text command to be entered at the command line level.

Publishing History

Date	Revision	Update details
January 2009	0.9	Initial draft
February 2009	0.91	Pre-release
January 2010	1.01	Add B095-004/003 Console Server and Firmware 3.0.1 features

2. INSTALLATION

Introduction

This chapter describes the physical installation of the Console Server hardware and connection to controlled devices.

2.1 Models

There are a number of Console Server models, each with a different number of network, USB and serial ports and power supplies:

	Serial Ports	Network Ports	Console Port	USB Port	Modem	Power
B096-048	48	2	1	1	Internal	Dual AC Universal Input
B096-016	16	2	1	1	Internal	Dual AC Universal Input
B092-016	16	1	1+KVM	4	-	Single AC Universal Input
B095-004-1E	4	1	1	1	-	External DC Supply
B095-003-1E-M	3	1	1	1	Internal	External DC Supply

2.1.1 Kit Components: B096-048 and B096-016 Console Server Management Switch

B096-048 or B096-016
Console Server Management Switch

2 x Cable UTP Cat5 blue

Connectors
DB9F-RJ45S straight and cross-over

Dual IEC AC power cords

Quick Start Guide and CD-ROM

- Unpack your Console Server Management Switch kit and verify you have all the parts shown above, and that they all appear in good working order.
- If you are installing your Console Server Management Switch in a rack you will need to attach the rack mounting brackets supplied with the unit, and install the unit in the rack. Take care to head the Safety Precautions.
- Connect your Console Server Management Switch to the network, to the serial ports of the controlled devices, and to power as outlined below.

2.1.2 Kit Components: B092-016 Console Server with PowerAlert

B092-016
Console Server with PowerAlert

2 x Cable UTP Cat5 blue

Connector DB9F-RJ45S straight and DB9F-RJ45S cross-over

AC power cable

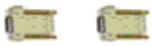
Quick Start Guide and CD-ROM

- Unpack your Console Server and verify you have all the parts shown above, and that they all appear in good working order.
- If you are installing your Console Server in a rack, you will need to attach the rack mounting brackets supplied with the unit, and install the unit in the rack. Take care to heed the Safety Precautions listed earlier.
- Proceed to connect your B092-016 to the network, to the serial and USB ports of the controlled devices, to any rack side LCD console or KVM switch and to power as outlined below.

2.1.3 Kit Components: B095-004-1E and B095-003-1E-M Console Server

B095-004-1E 4-port Console Server with single NIC or B095-003-1E-M 3-port Console Server with single NIC and modem

2 x Cable UTP Cat5 blue



Connectors
DB9F-RJ45S straight and cross-over

External power supply

Quick Start Guide and CD-ROM

- Unpack your Console Server kit and verify you have all the parts shown above, and that they all appear in good working order.
- If you are installing your Console Server in a rack you will need to attach the rack mounting brackets supplied with the unit, and install the unit in the rack. Take care to head the Safety Precautions.
- Proceed to connect your Console Server to the network, to the serial ports of the controlled devices, and to power as outlined below.

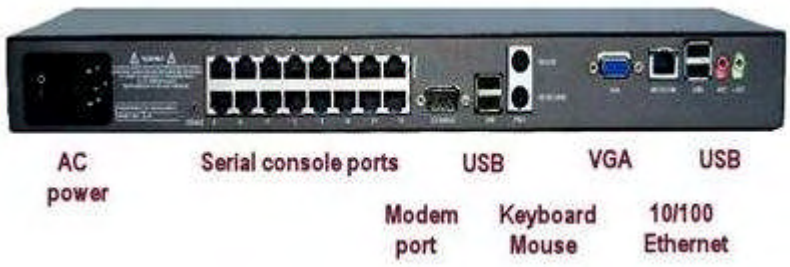
2.2 Power Connection

2.2.1 Power: Console Server Management Switch

The B096-048/16 Console Server Management Switch has dual universal AC power supplies with auto failover built in. These power supplies each accept AC input voltage between 100 and 240 VAC with a frequency of 50 or 60 Hz and the total power consumption per Console Server is less than 30W. Two IEC AC power sockets are located at the rear of the metal case, and these IEC power inlets use conventional IEC AC power cords. A North American power cord is provided by default. Power cords for other regions are available separately from Tripp Lite.

2.2.2 Power: Console Server with PowerAlert

The standard B092-016 Console Server has a built-in universal auto-switching AC power supply. This power supply accepts AC input voltage between 100 and 240 VAC with a frequency of 50 or 60 Hz and the power consumption is less than 40W.



The AC power socket is located at the rear of the B092-016. This power inlet uses a conventional AC power cord. A North American power cord is provided by default. Power cords for other regions are available separately from Tripp Lite.

2.2.3 Power: Console Server Management Switch

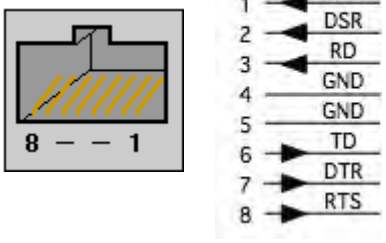
The B095-004/003 Console Server has an external wall mount power supply. This power supply accepts AC input voltage between 100 and 240 VAC with a frequency of 50 or 60 Hz and the total power consumption per console server is less than 20W. The DC power sockets on the B095-004/003 Console Server are located on the side of the metal case marked PXR.

2.3 Network Connection

The RJ45 10/100 LAN port is located on the rear of the B092-016 Console Server, on the front of the B096-048/016 Console Server Management Switch and on the side panel of the B095-004/003 Console Server . All physical connections are made using industry standard Cat5e patch cables (Tripp Lite N001- and N002-series cables). Ensure you only connect the LAN port to an Ethernet network that supports 10Base-T/100Base-T. For the initial configuration of the Console Server you must connect a computer to the Console Server's principal network port.

2.4 Serial Port Connection

The RJ45 serial ports are located on the rear of the B092-016 Console Server, on the front of the B096-048/016 Console Server Management Switch and on the side panel of the B095-004/003 Console Server. These Console Servers use the RJ45 pinout used by Cisco. Use straight through RJ45 cabling to connect to equipment such as Cisco, Juniper, SUN, and more.



PIN	SIGNAL	DEFINITION	DIRECTION
1	CTS	Clear To Send	Input
2	DSR	Data Set Ready	Input
3	RXD	Receive Data	Input
4	GND	Signal Ground	NA
5	GND	Signal Ground	NA
6	TXD	Transmit Data	Output
7	DTR	Data Terminal Ready	Output
8	RTS	Request To Send	Output

Conventional Cat5 cabling with RJ45 jacks are used for serial connections. Before connecting the console port of an external device to the Console Server serial port, confirm that the device supports standard RS-232C (EIA-232).

The Console Server also has a DB9 LOCAL (Console/Modem) port. This DB-9 connector is on the rear panel of the B092-016 Console Server, and on the front panel of the B096-048/016 Console Server Management Switch.

2.5 USB Port Connection

The B096-048/016 Console Server Management Switch has one USB port on the front panel. External USB devices can be plugged into this USB port. The B096-048/016 Console Server Management Switch ships with a USB memory stick so that it will be installed in this port for extended log file storage.

There are four USB 2.0 ports on the rear panel of the B092-016 Console Server and one USB 2.0 port located under the RJ45 10/100 LAN connector on the B095-004/003 Console Server. These ports are used to connect to USB consoles (of managed UPS hardware) and to other external devices (such as a USB memory stick or keyboard).

External USB devices (including USB hubs) can be plugged into any Console Server USB port.

2.6 Rackmount Console / KVM Connection (B092-016 only)

B092-016 Console Server with PowerAlert can be connected directly to a rackmount console (such as B021-000-17 or B021-019 by Tripp Lite) to provide direct local management right at the rack. Connect the rackmount console's PS/2 Keyboard/Mouse and VGA connectors directly to the PS/2 and VGA connectors on the B092-016. The default video resolution is 1024 x768. The B092-016 Console Server also supports the use of a USB keyboard/mouse.

Alternately, the B092-016 Console Server can also be connected locally to a KVM (or KVMoIP) switch at the rack. The B092-016 Console Server with PowerAlert will enable you then to use this KVM infrastructure to run PowerAlert, to manage your power devices and to run the thin clients to manage other devices.

Note Care should be taken in handling all Console Server products. There are no operator-serviceable components inside, so do not remove cover. Refer any service to qualified personnel.

3. INITIAL SYSTEM CONFIGURATION

Introduction

This chapter provides step-by-step instructions for the initial configuration of your Console Server and connecting it to your management or operational network. This involves the Administrator:

- Activating the Management Console
- Changing the Administrator password
- Setting the IP address for the Console Server's principal LAN port
- Selecting the network services to be supported

This chapter also discusses the communications software tools that the Administrator may use to access the Console Server. It also covers the configuration of the additional LAN ports on the B096-016/048 Console Server Management Switch.

3.1 Management Console Connection

Your Console Server has a default IP Address 192.168.0.1 Subnet Mask 255.255.255.0

- Directly connect a computer to the Console Server.

Note For initial configuration it is recommended that the Console Server be connected directly to a single computer. However, if you choose to connect your LAN before completing the initial setup steps, it is important that:

- You ensure there are no other devices on the LAN with an **address of 192.168.0.1**
- The Console Server and the computer are on the same LAN segment, with no interposed router appliances

---

3.1.1 Connected Computer Set Up

To configure the Console Server with a browser, the connected computer should have an IP address in the same range as the Console Server (e.g. 192.168.0.100):

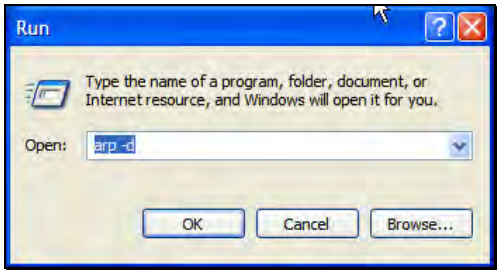
- To configure the IP address of your Linux or Unix computer simply run ifconfig
- For Windows computers (Win9x/Me/2000/XP/ Vista/ NT):
  - Click Start -> (Settings ->) Control Panel and double click Network Connections (for 95/98/Me, double click Network)
  - Right-click on Local Area Connection and select Properties
  - Select Internet Protocol (TCP/IP) and click Properties
  - Select Use the following IP address and enter the following details:

- IP address: 192.168.0.100
- Subnet mask: 255.255.255.0

- If you wish to retain your existing IP settings for this network connection, click Advanced and Add the above as a secondary IP connection

➢ If it is not convenient to change your computer network address, you can use the ARP-Ping command to reset the Console Server IP address. To do this from a Windows computer:

- Click Start -> Run
- Type cmd and click OK to bring up the command line
- Type arp –d to flush the ARP cache
- Type arp –a to view the current ARP cache which should be empty



Now add a static entry to the ARP table and ping the Console Server to have it get the IP address. In the example below we have a Console Server with a MAC address 00:13:C6:00:02:0F (designated on the label on the bottom of the unit) and we are setting its IP address to 192.168.100.23. The computer issuing the arp command must be on the same network segment as the Console Server (i.e. have an IP address of 192.168.100.xxx).

- Type arp -s 192.168.100.23 00-13-C6-00-02-0F (Note for UNIX the syntax is: arp -s 192.168.100.23 00:13:C6:00:02:0F)
- Type ping -t 192.18.100.23 to start a continuous ping to the new IP address
- Turn on the Console Server and wait for it to configure itself with the new IP address. It will start replying to the ping at this point
- Type arp –d to flush the ARP cache again

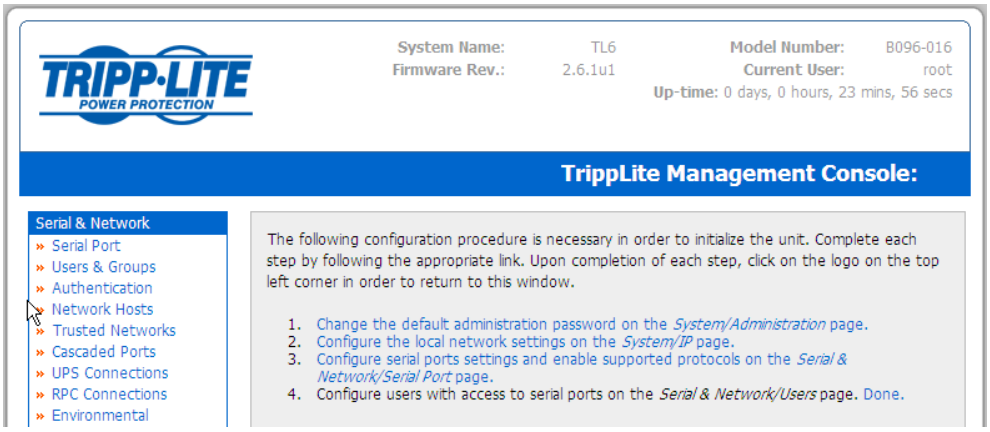
3.1.2 Browser Connection

➢ Activate your preferred browser on the connected computer and enter https://192.168.0.1 The Console Server supports all current versions of the popular browsers (Netscape, Internet Explorer, Mozilla Firefox and more).

- You will be prompted to log in. Enter the default administration username and administration password:

  Username: root

  Password: default


TRIPP·LITE
POWER PROTECTION
System Name: TL6
Firmware Rev.: 2.6.1u1
Model Number: B096-016
Current User: root
Up-time: 0 days, 0 hours, 23 mins, 56 secs
TrippLite Management Console:
Serial & Network
» Serial Port
» Users & Groups
» Authentication
» Network Hosts
» Trusted Networks
» Cascaded Ports
» UPS Connections
» RPC Connections
» Environmental
The following configuration procedure is necessary in order to initialize the unit. Complete each step by following the appropriate link. Upon completion of each step, click on the logo on the top left corner in order to return to this window.
1. Change the default administration password on the System/Administration page.
2. Configure the local network settings on the System/IP page.
3. Configure serial ports settings and enable supported protocols on the Serial & Network/Serial Port page.
4. Configure users with access to serial ports on the Serial & Network/Users page. Done.

The above screen, which lists four initial installation configuration steps, will be displayed:

1. Change the default administration password on the System/Administration page (Chapter 3).
2. Configure the local network settings on the System/IP page (Chapter 3).
3. Configure port settings and enable the Serial & Network/Serial Port page (Chapter 4).
4. Configure users with access to serial ports on the Serial & Network/Users page (Chapter 3).

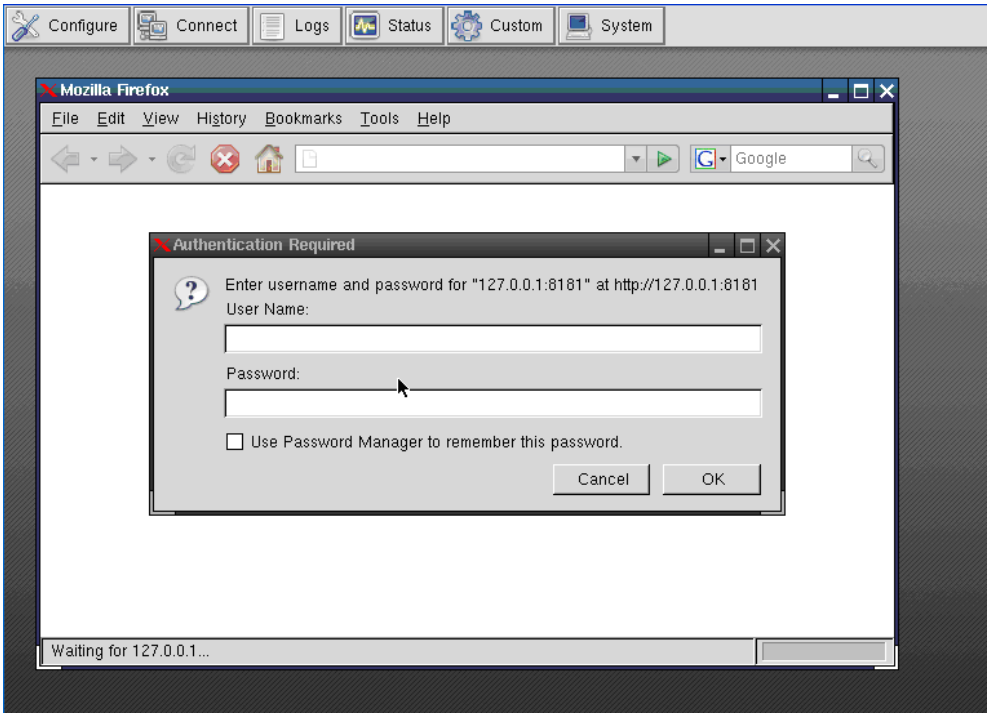
After completing each of the above steps, you can return to the configuration list by clicking in the top left corner of the screen on the logo:

Note If you are not able to connect to the Management Console at 192.168.0.1 or if the default Username / Password were not accepted then reset your Console Server (refer to *Chapter 10*).

3.1.3 Initial B092-016 Connection

For the initial configuration of the B092-016 Console Server, you will need to connect a console (keyboard, mouse and display) or a KVM switch directly to its mouse, keyboard and VGA ports. When you initially power on the B092-016, you will be prompted on your directly connected video console to log in:

- Enter the default administration username and password (Username: root Password: default). The B092-016 control panel will be displayed.
- Click the Configure button on the control panel. This will load the Firefox browser and open the B092-016 Management Console.

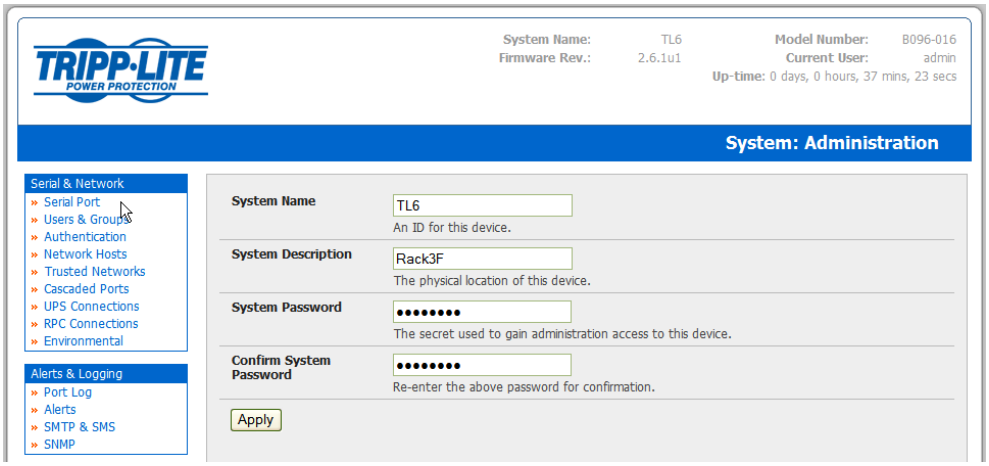


- At the Management Console menu select System: Administration.

3.2 Administrator Password

For security reasons, only the administration user named root can initially log into your Console Server. Only those people who know the root password can access and reconfigure the Console Server itself. However, anyone who correctly guesses the root password (and the default root password which is default) could gain access. It is therefore essential that you enter and confirm a new root password before giving the Console Server any access to, or control of, your computers and network appliances.

Note: It is also recommended that you set up a new Administrator user as soon as convenient and log-in as this new user for all ongoing administration functions (rather than *root*). This Administrator can be configured in the *admin* group with full access privileges through the **Serial & Network: Users & Groups** menu as detailed in Ch*apter 4.*



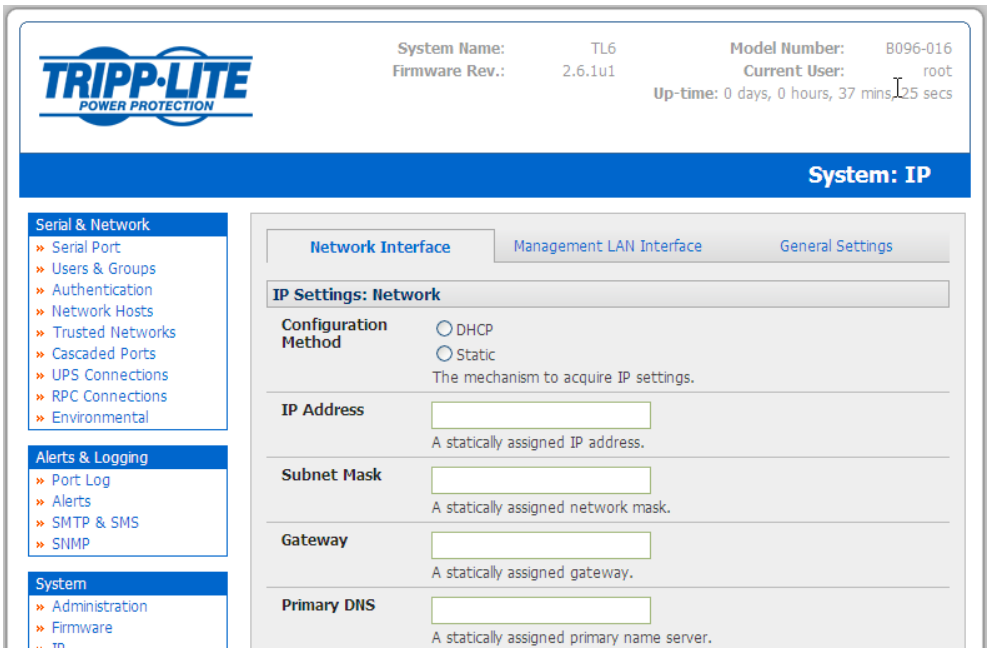
- Select System: Administration.
- Enter a new System Password then re-enter it in Confirm System Password. This is the new password for root, the main administrative user account, so it is important that you choose a complex password, and keep it safe.
- You may now wish to enter a System Name and System Description for the Console Server to give it a unique ID and make it simple to identify.
- Click Apply. As password has been changed, you will be prompted to log in again. This time use the new password.

Note If you are not confident your Console Server has been supplied with the current release of firmware, you can upgrade. Refer to *Upgrade Firmware - Chapter 10*.

3.3 Network IP Address

It is time to enter an IP address for the principal 10/100 LAN port on the Console Server; or enable its DHCP client so that it automatically obtains an IP address from a DHCP server on the network to which it is to be connected.

- On the System: IP menu select the Network Interface page then check DHCP or static for the Configuration Method.
- If you select static you must manually enter the new IP Address, Subnet Mask, Gateway and DNS server details. This selection automatically disables the DHCP client.



- If you select DHCP, the Console Server will look for configuration details from a DHCP server on your management LAN. This selection automatically disables any static address. The Console Server MAC address can be found on a label on the base plate.

Note In its factory default state (with no Configuration Method selected) the Console Server has its DHCP client enabled, so it automatically accepts any network IP address assigned by a DHCP server on your network. In this initial state, the Console Server will then respond to both its Static address (192.168.0.1) and its newly assigned DHCP address.

- By default, the Console Server 10/100 LAN port auto detects the Ethernet connection speed. However you can use the Media menu to lock the Ethernet to 10 Mb/s or 100Mb/s and to Full Duplex (FD) or Half Duplex (HD).

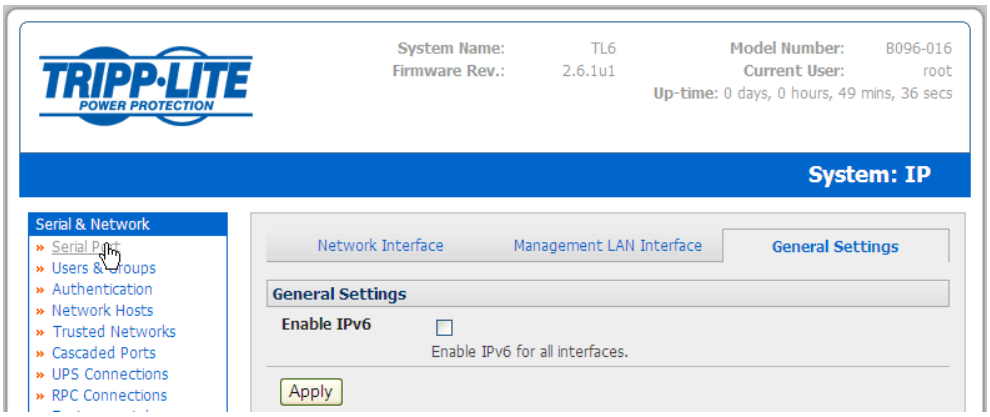
Note If you have changed the Console Server IP address, you may need to reconfigure your Computer so it has an IP address that is in the same network range as this new address (as detailed in an earlier note in this chapter).

- Click Apply.
- You will need to reconnect the browser on the Computer that is connected to the Console Server by entering http://new IP address.

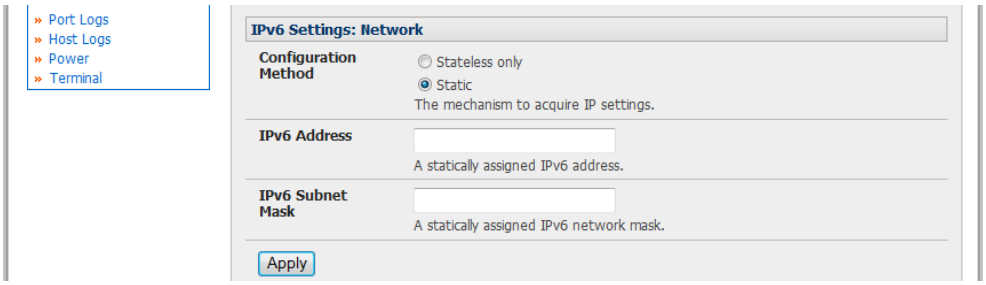
3.3.1 IPv6 Configuration

By default, the Console Server Ethernet interfaces support IPv4, however, they can also be configured for IPv6 operation:

- On the System: IP menu select General Settings page and check Enable IPv6.

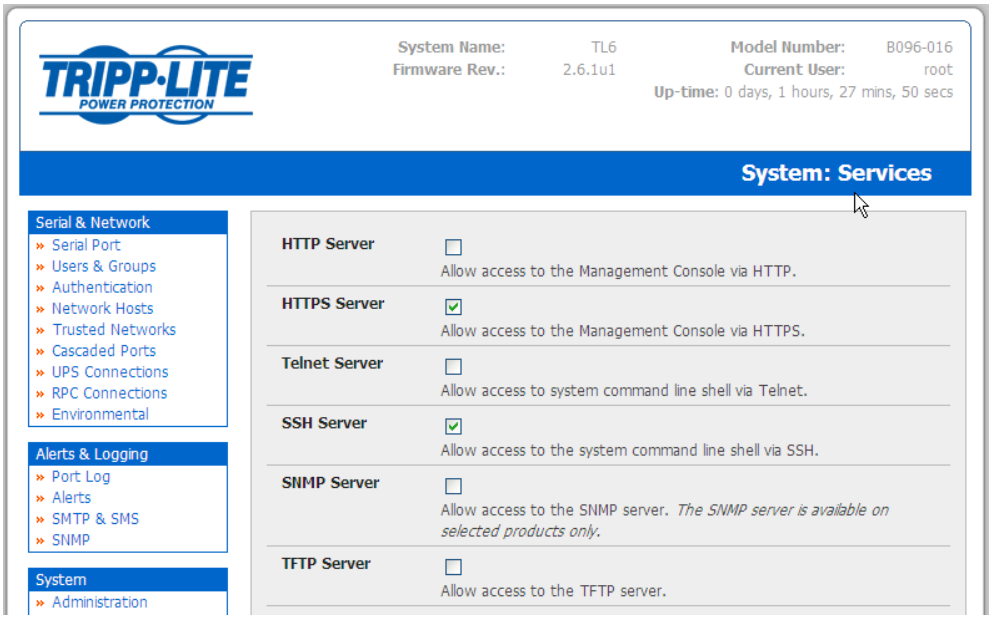


- You will then need to configure the IPv6 parameters on each interface page.



3.4 System Services

The Administrator has a selection of access protocols that can be used to access the Console Server. The factory default enables HTTPS and SSH access to the Console Server and disables HTTP and Telnet. The User can also use the nominated services for limited access to the Console Server itself. The Administrator can configure the services to be enabled:



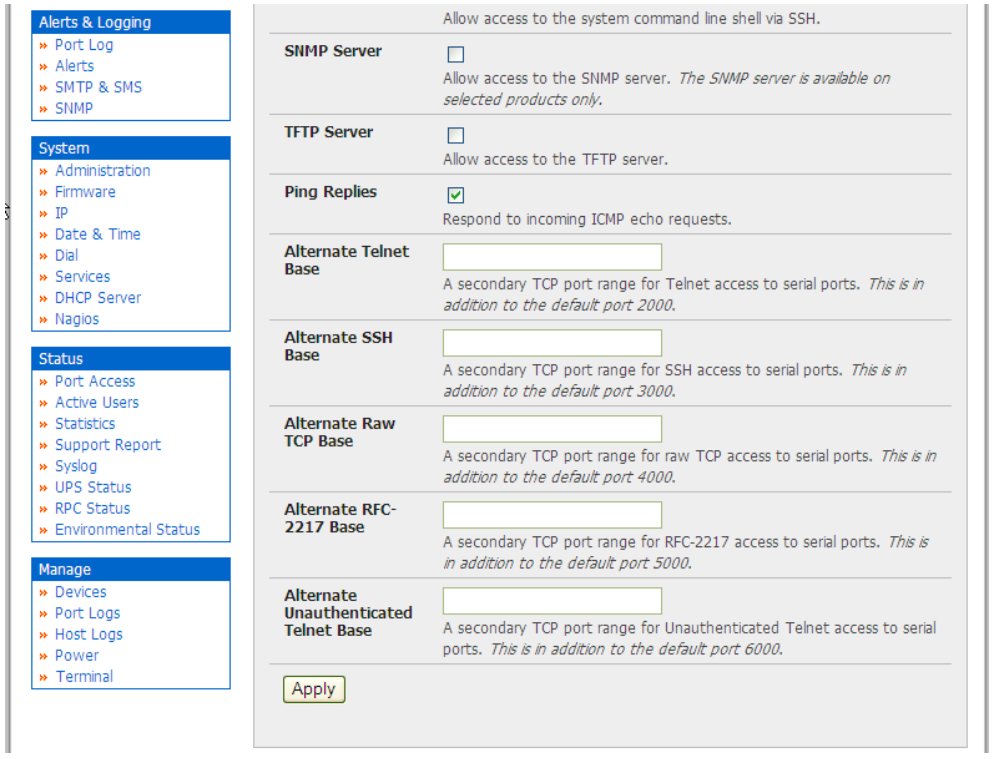
- Select System: Services. Then select /deselect the service to be enabled /disabled. The following access protocol options are available:

  HTTPS — Ensures secure browser access to all the Management Console menus. It also allows appropriately configured Users secure browser access to selected Management Console Manage menus. If HTTPS is enabled, the Administrator will be able to use a secure browser connection to the Console Server's Management Console. For information on certificate and user/client software configuration, refer to Chapter 9 - Authentication. By default, HTTPS is enabled, and it is recommended that only HTTPS access be used if the Console Server is to be managed over any public network (e.g. the Internet).

  HTTP — Allows the Administrator basic browser access to the Management Console. It is recommended that you disable the HTTP service if the Console Server is to be remotely accessed over the Internet.

  Telnet — Gives the Administrator Telnet access to the system command line shell (Linux commands). While this may be suitable for a local direct connection over a management LAN, it is recommended this service be disabled if the Console Server is to be remotely administered.

  SSH — Provides secure SSH access to the Linux command line shell. It is recommended you choose SSH as the protocol when the Administrator is connecting to the Console Server over the Internet or over any other public network. This will provide authenticated communications between the SSH client program on the remote Computer and the SSH sever in the Console Server. For more information on SSH configuration, refer to Chapter 9 - Authentication.


Alerts & Logging
» Port Log
» Alerts
» SMTP & SMS
» SNMP
System
» Administration
» Firmware
» IP
» Date & Time
» Dial
» Services
» DHCP Server
» Nagios
Status
» Port Access
» Active Users
» Statistics
» Support Report
» Syslog
» UPS Status
» RPC Status
» Environmental Status
Manage
» Devices
» Port Logs
» Host Logs
» Power
» Terminal
Allow access to the system command line shell via SSH.
SNMP Server
Allow access to the SNMP server. The SNMP server is available on selected products only.
TFTP Server
Allow access to the TFTP server.
Ping Replies
Respond to incoming ICMP echo requests.
Alternate Telnet Base
A secondary TCP port range for Telnet access to serial ports. This is in addition to the default port 2000.
Alternate SSH Base
A secondary TCP port range for SSH access to serial ports. This is in addition to the default port 3000.
Alternate Raw TCP Base
A secondary TCP port range for raw TCP access to serial ports. This is in addition to the default port 4000.
Alternate RFC-2217 Base
A secondary TCP port range for RFC-2217 access to serial ports. This is in addition to the default port 5000.
Alternate Unauthenticated Telnet Base
A secondary TCP port range for Unauthenticated Telnet access to serial ports. This is in addition to the default port 6000.
Apply

- There are also a number of related service options that can be configured at this stage:

  SNMP — Enables netsnmp in the Console Server which will keep a remote log of all posted information. SNMP is disabled by default. To modify the default SNMP settings, the Administrator must make the edits at the command line as described in Chapter 15 – Advanced Configuration.

  TFTP — The Console Servers set up default TFTP server on the USB flash card. This server can be used to store config files, maintain access and transaction logs, etc.

  Ping — Allows the Console Server to respond to incoming ICMP echo requests. Ping is enabled by default, however, for security reasons this service should generally be disabled post initial configuration.

- And there are some serial port access parameters that can be configured on this menu:

  Base — The Console Server uses specific default ranges for the TCP/IP ports for the various access services that Users and Administrators can use to access devices attached to serial ports (as covered in Chapter 4 – Configuring Serial Ports). The Administrator can also set alternate ranges for these services, and these secondary ports will then be used in addition to the defaults.

  The default TCP/IP base port address for Telnet access is 2000, and the range for Telnet is IP Address: Port (2000 + serial port #) i.e. 2001 – 2048. So if the Administrator were to set 8000 as a secondary base for Telnet then serial port #2 on the Console Server can be Telnet accessed at IP Address: 2002 and at IP Address: 8002.

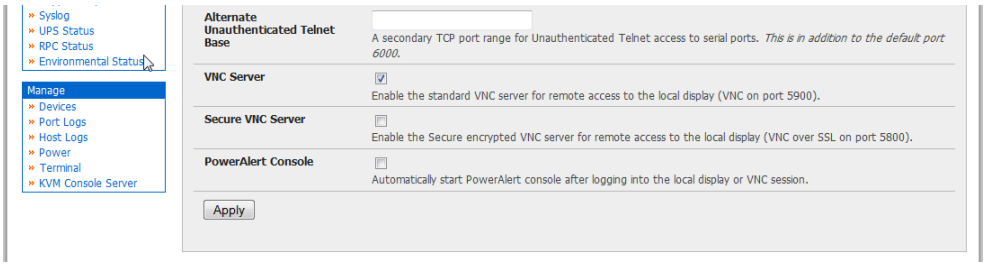
  The default base for SSH is 3000; for Raw TCP is 4000; for RFC2217 it is 5000 and for Unauthenticated Telnet it is 6000.

- The B092-016 Console Server with PowerAlert also presents some additional service and configuration options:

  VNC — The B092-016 Console Server has an internal VNC server. When enabled, it allows remote users to connect to the Console Server and run the PowerAlert software and any other embedded thin client programs as if they were plugged in locally to the KVM connectors on the B092-016 (refer to Chapter 16 for more details). Users connect using port 5900 and need to run a VNC client applet.

  Secure VNC — This enables a secure encrypted remote connection using VNC over SSL on port 5800 to the B092-016 Console Server (refer to Chapter 16).

  PowerAlert — This configuration option will automatically start the PowerAlert application on the B092-016 and display the console as soon as you log into the local display or VNC session (refer to Chapter 16). The complete PowerAlert manual can be downloaded at www.tripplite.com/EN/support/PowerAlert/Downloads.cfm


» Syslog
» UPS Status
» RPC Status
» Environmental Status
Manage
» Devices
» Port Logs
» Host Logs
» Power
» Terminal
» KVM Console Server
Alternate Unauthenticated Telnet Base
A secondary TCP port range for Unauthenticated Telnet access to serial ports. This is in addition to the default port 6000.
VNC Server
Enable the standard VNC server for remote access to the local display (VNC on port 5900).
Secure VNC Server
Enable the Secure encrypted VNC server for remote access to the local display (VNC over SSL on port 5800).
PowerAlert Console
Automatically start PowerAlert console after logging into the local display or VNC session.
Apply

- Click Apply. As you apply your services selections, the screen will be updated with a confirmation message:

  Message Changes to configuration succeeded.

3.5 Communications Software

You need to configure the access protocols that the communications software on the Administrator and User Computer will use when connecting to the Console Server (and when connecting to serial devices and network hosts which are attached to the Console Server).

This section provides an overview of the communications software tools that can be used on the remote computer. Tripp Lite recommends the SDT Connector software tool that is provided with the Console Server, however, generic tools such as PuTTY and SSHTerm may also be used.

3.5.1 SDT Connector

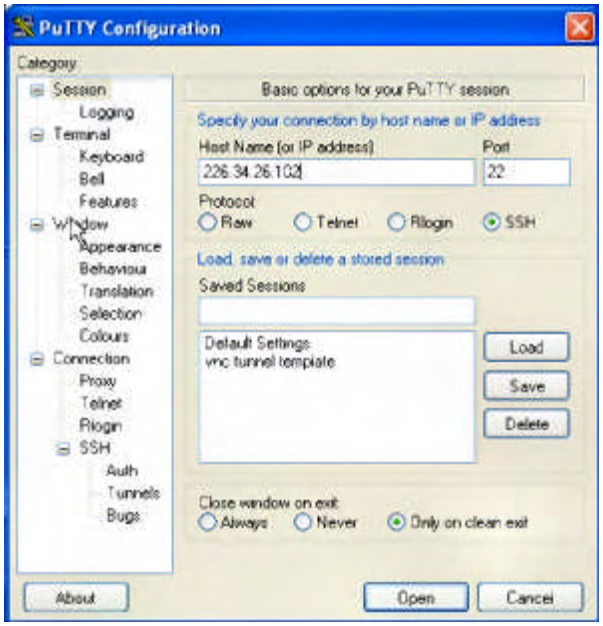
We recommend using the SDT Connector communications software for all communications with Console Servers. Each Console Server is supplied with an unlimited number of SDT Connector licenses to use with that Console Server.

SDT Connector is a lightweight tool that enables Users and Administrators to securely access the Console Server, and the various computers, network devices and appliances that may be serially or network-connected to the Console Server.

SDT Connector can be installed on Windows 2000, XP, 2003, Vista and on most Linux, UNIX and Solaris computers as detailed in Chapter 7.

3.5.2 PuTTY

Communications packages like PuTTY can be also used to connect to the Console Server command line (and to connect to serially attached devices as covered in Chapter 4). PuTTY is a freeware implementation of Telnet and SSH for Win32 and UNIX platforms. It runs as an executable application without needing to be installed onto your system. PuTTY (the Telnet and SSH client itself) can be downloaded at http://www.tucows.com/preview/195286.html



- To use PuTTY for an SSH terminal session from a Windows client, enter the Console Server's IP address as the 'Host Name (or IP address)'
- To access the Console Server command line, select 'SSH' as the protocol and use the default IP Port 22
- Click 'Open' and the Console Server login prompt will appear. (You may also receive a 'Security Alert' that the host's key is not cached. Choose 'yes' to continue.)
- Using the Telnet protocol is similarly simple, but you need to use the default port 23

3.5.3 SSHTerm

Another common communications package that may be useful is SSHTerm. This is an open source package that can be downloaded from http://sourceforge.net/projects/sshtools

- To use SSHTerm for an SSH terminal session from a Windows Client, simply Select the 'File' option and click on 'New Connection'
- A new dialog box will appear for your 'Connection Profile'. Type in the host name or IP address (for the Console Server unit) and the TCP port that the SSH session will use (port 22). Then type in your username and choose password authentication and click Connect

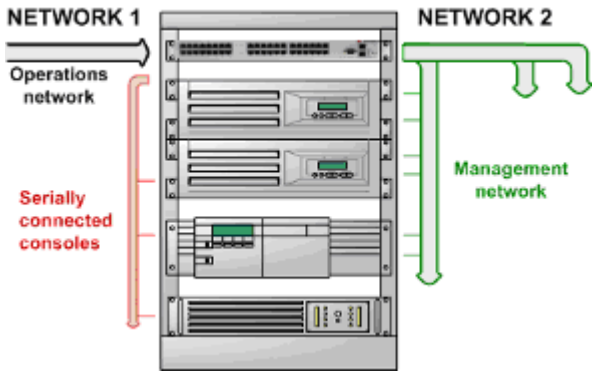
- A message may appear about the host key fingerprint. You will need to select 'Yes' or 'Always' to continue
- The next step is password authentication. You will be prompted for your username and password from the remote system. You will then be logged on to the Console Server

3.6 Management Network Configuration (B096-048/016 only)

The B096-048/016 Console Server Management Switches have a second Ethernet network port that can be configured as a management Console Server/LAN port or as a failover/OoB access port.

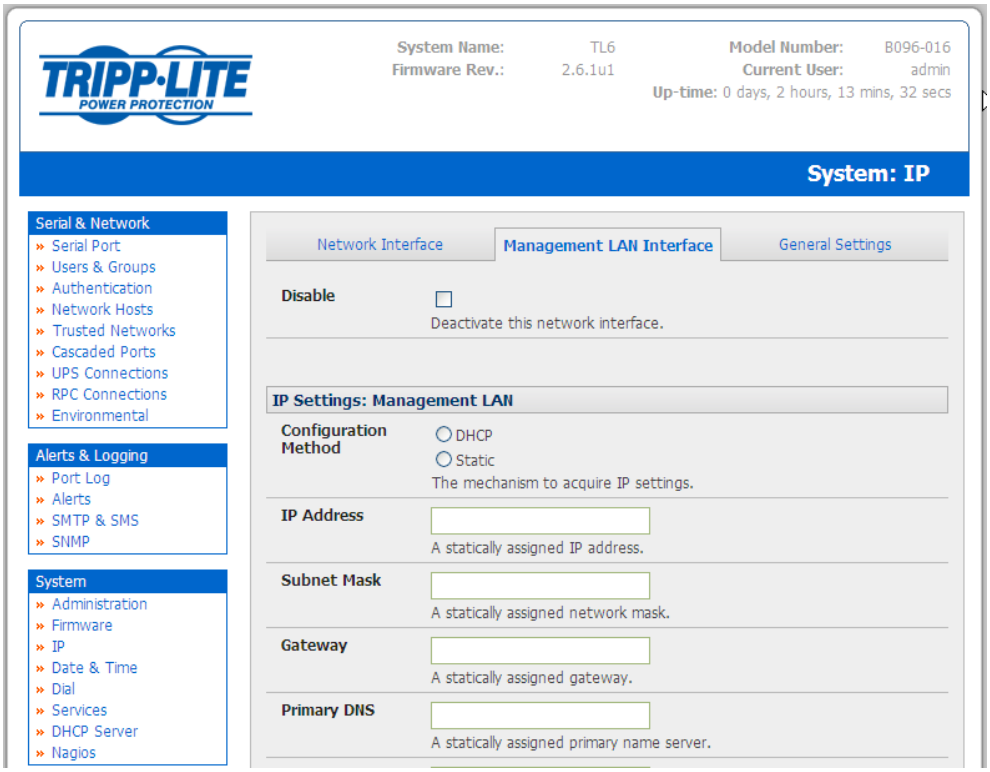
3.6.1 Configure Management Switch as a Management LAN Gateway

The Management Switch in the B096-048/016 Console Servers can be configured to provide a management LAN gateway. With this configuration, the B096-048/016 provides firewall, router and DHCP server features and you can connect managed hosts to this management LAN.



These features are all disabled by default. To configure the Management LAN gateway:

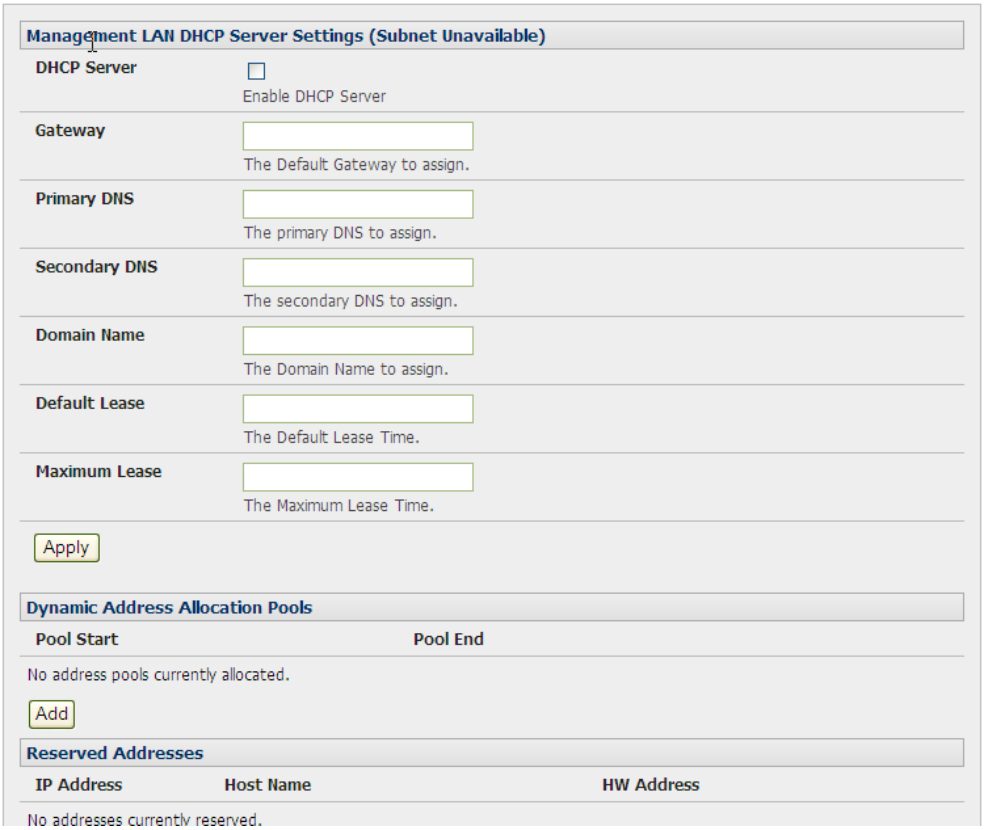
- Select the Management LAN page on the System: IP menu and uncheck Disable.
- Configure the IP Address and Subnet Mask for the Management LAN (leaving the Gateway and DNS fields blank) then click Apply.
- The management LAN gateway function is now enabled with default firewall and router rules. These rules can be reconfigured at the command line.



Note The second Ethernet port on the B096-048/016 can be configured as either a Management LAN gateway port **or** it can be configured as an OoB/Failover port - but not both. So be sure that you did not allocate **Management LAN** as the **Failover Interface** when you configured the principal **Network** connection on the **System: IP** menu.

The B096-048/016 Console Server Management Switches also host a DHCP server which by default is set at disabled. The DHCP server enables the automatic distribution of IP addresses to hosts running DHCP clients on the Management LAN. To enable the DHCP server:

- On the System: IP menu select the Management LAN page and click the Disabled label in the DHCP Server field; or go to the System: DHCP Server menu and check Enable DHCP Server .



To configure the DHCP server for the Management LAN:

- Enter the Gateway address that is to be issued to the DHCP clients. If this field is left blank, the IP address of the B096-048/016 will be used.
- Enter the Primary DNS and Secondary DNS address to issue the DHCP clients. Again if this field is left blank, the IP address of the B096-048/016 is used, so leave this field blank for automatic DNS server assignment.
- Optionally enter a Domain Name suffix to issue DHCP clients.
- Enter the Default Lease time and Maximum Lease time in seconds. The lease time is the time that a dynamically assigned IP address is valid before the client must request it again.
- Click Apply.

The DHCP server will sequentially issue IP addresses from a specified address pool(s):

- Click Add in the Dynamic Address Allocation Pools field.
- Enter the DHCP Pool Start Address and End Address and click Apply.

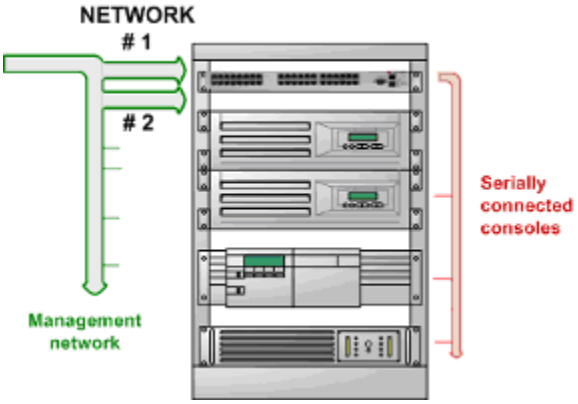
The DHCP server also supports pre-assigning IP addresses to be allocated only to specific MAC addresses and reserving IP addresses to be used by connected hosts with fixed IP addresses. To reserve an IP addresses for a particular host:

- Click Add in the Reserved Addresses field.
- Enter the Hostname, the Hardware Address (MAC) and the Statically Reserved IP address for the DHCP client and click Apply .

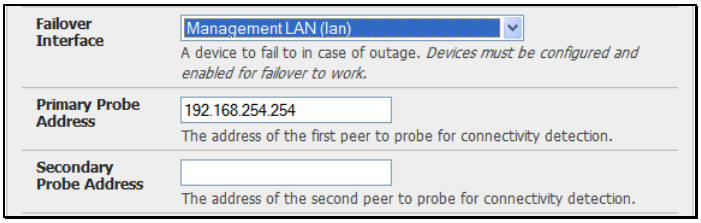
Once DHCP has initially allocated hosts addresses, it is recommended to copy these into the pre-assigned list so the same IP address will be reallocated in the event of a reboot.

3.6.2 Configure Management Switch for Failover or Broadband OoB

The Management Switch in the B096-048/016 Console Server can be configured to provide a failover option. In the event of a problem using the main LAN connection for accessing the Console Server, an alternate access path is used.



- By default, the failover is not enabled. To enable, select the Network page on the System: IP menu.
- Now select the Failover Interface to be used in the event of an outage on the main network. This can be:
  - an alternate broadband Ethernet connection or
  - the B096-048/016 internal modem or
  - an external serial modem/ISDN device connected to the B096-048/016 console port (for out-dialing to an ISP or the remote management office)


Failover Interface
Management LAN (lan)
A device to fail to in case of outage. Devices must be configured and enabled for failover to work.
Primary Probe Address
192.168.254.254
The address of the first peer to probe for connectivity detection.
Secondary Probe Address
The address of the second peer to probe for connectivity detection.

- Click Apply. You have selected the failover method. However, it is not active until you have specified the external sites to be probed to trigger failover and set up the failover ports themselves. This is covered in Chapter 5.

Note The second Ethernet port on the B096-048/016 can be configured as either a Management LAN gateway port **or** it can be configured as an OoB/Failover port - but not both. So ensure you did not configure this port as the **Management LAN** on the **System: IP** menu.

4. SERIAL PORT AND NETWORK HOST

Introduction

The Console Server enables access and control of serially-attached devices and network-attached devices (hosts). The Administrator must configure access privileges for each of these devices, and specify the services that can be used to control the devices. The Administrator can also set up new users and specify each user's individual access and control privileges.

This chapter covers each of the steps in configuring hosts and serially attached devices:

Configure Serial Ports – setting up the protocols to be used in accessing serially-connected devices

Users & Groups – setting up users and defining the access permissions for each of these users

Authentication – covered in Chapter 9

Network Hosts – configuring access to local network connected computers or appliances (referred to as hosts)

Configuring Trusted Networks

Cascading and Redirection of Serial Console Ports

Connecting to Power (UPS, PDU and IPMI) and Environmetal Monitoring (EMD) devices

Serial Port Redirection -using the VirtualPort windows client

Managed Devices -presents a consolidated view of all the connections (version 3.0 firmware and later)

IPSec–enabling VPN connection (version 3.0 firmware and later)

4.1 Configuring Serial Ports

To configure a serial port you must first set the Common Settings (Chapter 4.1.1) that are to be used for the data connection to that port (e.g. baud rate) and the mode the port is to operate in. Each port can be set to support one of five operating modes:

i. Console Server Mode (Chapter 4.1.2) is the default setting and enables general access to the serial console port on serially attached devices.

ii. Device Mode (Chapter 4.1.3) sets the serial port up to communicate with an intelligent serial controlled PDU, UPS or Environmental Monitor Devices (EMD).

iii. SDT Mode (Chapter 4.1.4) enables graphical console access (with RDP, VNC, HTTPS etc) to hosts that are serially connected.

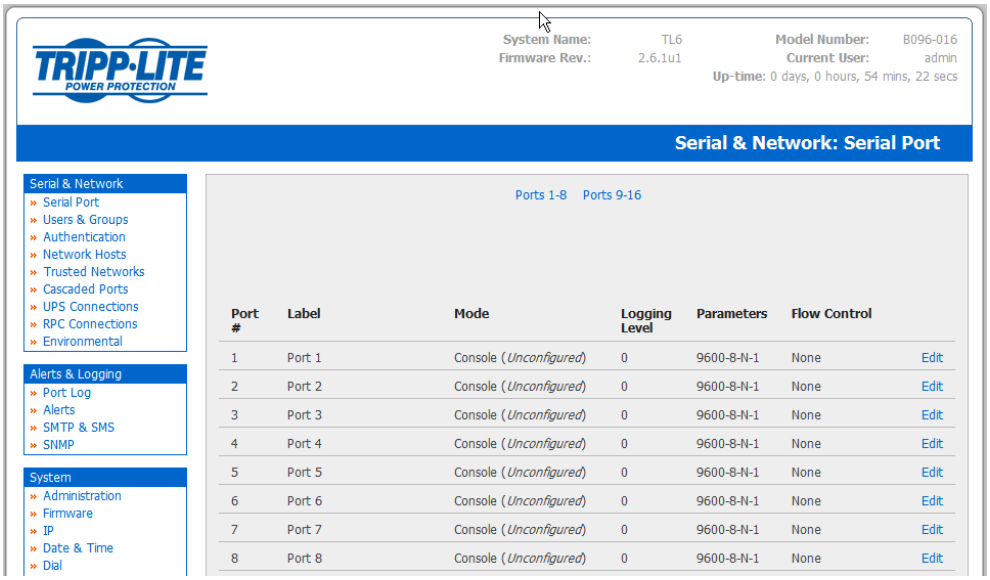
iv. Terminal Server Mode (Chapter 4.1.5) sets the serial port to await an incoming terminal login session.

v. Serial Bridge Mode (Chapter 4.1.6) enables the transparent interconnection of two serial port devices over a network.

To select the serial port to configure:

- Select Serial & Network: Serial Port and click Edit on the port to be reconfigured.

Note If you wish to set the same protocol options for multiple serial ports at once, click **Edit Multiple Ports** and select which ports you wish to configure as a group.


TRIPP·LITE
POWER PROTECTION
System Name: TL6
Firmware Rev.: 2.6.1u1
Model Number: B096-016
Current User: admin
Up-time: 0 days, 0 hours, 54 mins, 22 secs
Serial & Network: Serial Port
Serial & Network
» Serial Port
» Users & Groups
» Authentication
» Network Hosts
» Trusted Networks
» Cascaded Ports
» UPS Connections
» RPC Connections
» Environmental
Alerts & Logging
» Port Log
» Alerts
» SMTP & SMS
» SNMP
System
» Administration
» Firmware
» IP
» Date & Time
» Dial
Ports 1-8 Ports 9-16
Port # Label Mode Logging Level Parameters Flow Control
1 Port 1 Console (Unconfigured) 0 9600-8-N-1 None Edit
2 Port 2 Console (Unconfigured) 0 9600-8-N-1 None Edit
3 Port 3 Console (Unconfigured) 0 9600-8-N-1 None Edit
4 Port 4 Console (Unconfigured) 0 9600-8-N-1 None Edit
5 Port 5 Console (Unconfigured) 0 9600-8-N-1 None Edit
6 Port 6 Console (Unconfigured) 0 9600-8-N-1 None Edit
7 Port 7 Console (Unconfigured) 0 9600-8-N-1 None Edit
8 Port 8 Console (Unconfigured) 0 9600-8-N-1 None Edit

- When you have configured the common settings and the mode for each port, set up any remote syslog (Chapter 4.1.7), then click Apply.

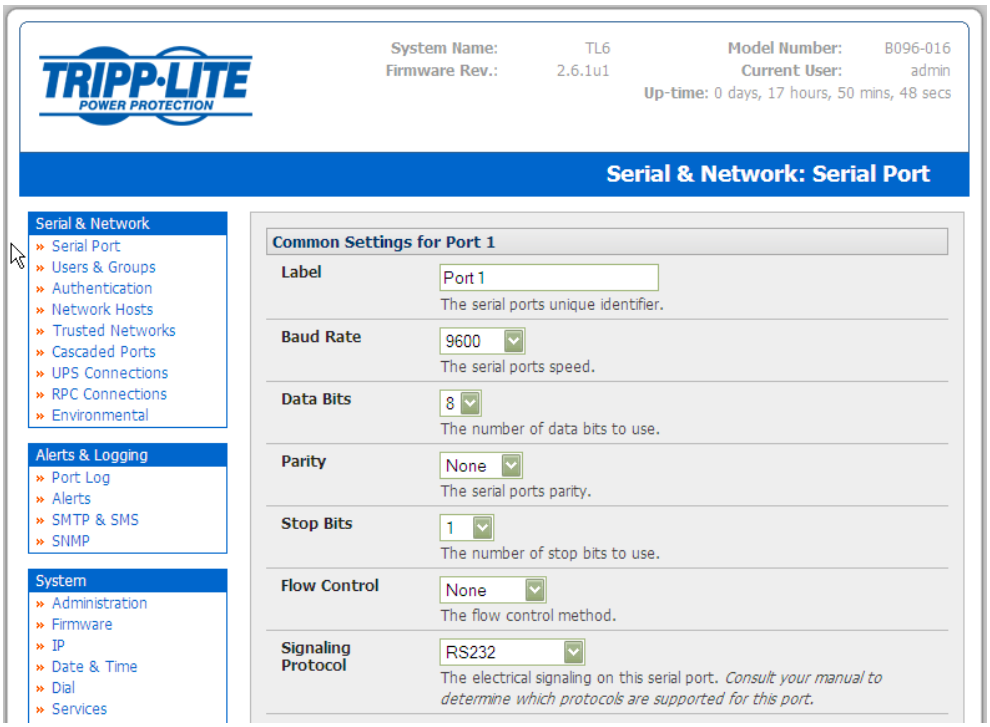
- If the Console Server has been configured with distributed Nagios monitoring enabled then you will also be presented with Nagios Settings options to enable nominated services on the Host to be monitored (refer to Chapter 10 – Nagios Integration).

4.1.1 Common Settings

There are a number of common settings available for each serial port. These are independent of the mode in which the port is being used. These serial port parameters must be set so they match the serial port parameters on the device which is attached to that port:

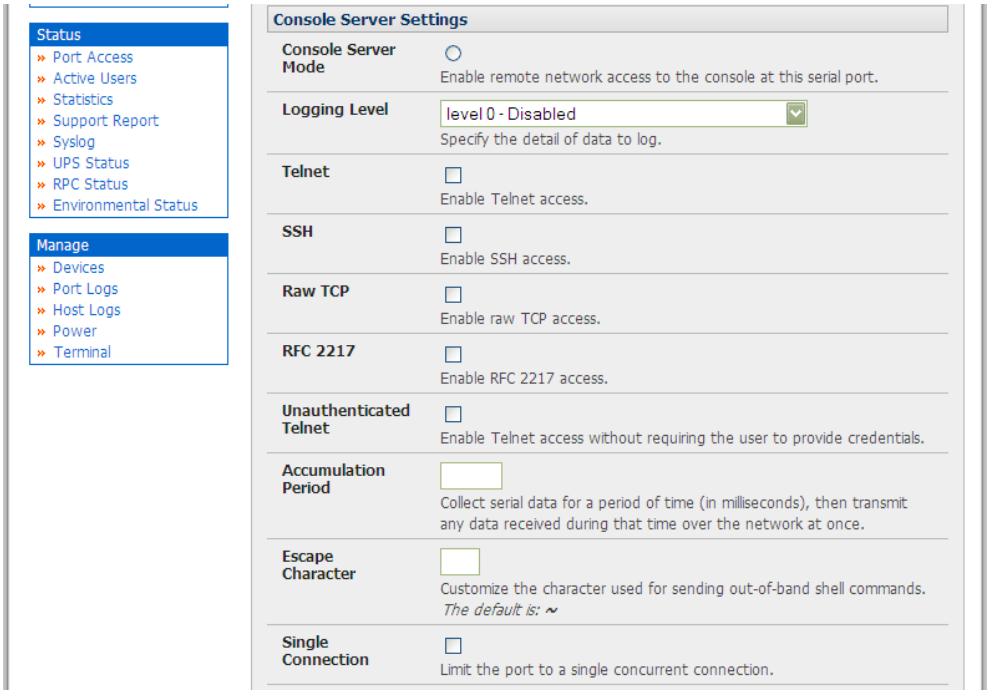
- Specify a label for the port.
- Select the appropriate Baud Rate, Parity, Data Bits, Stop Bits and Flow Control for each port (and ensure they match the settings for serial device that is connected). The Signaling Protocol is hard configured to be RS232.

Note The serial ports are all set at the factory to RS232 9600 baud, no parity, 8 data bits, 1 stop bit and Console Server Mode. The baud rate can be changed to 2400 – 230400 baud using the management console. Lower baud rates (50, 75, 110, 134, 150, 200, 300, 600, 1200, 1800 baud) can be configured from the command line as detailed in *Chapter 14.*



4.1.2 Console Server Mode

Select Console Server Mode to enable remote management access to the serial console that is attached to the serial port:



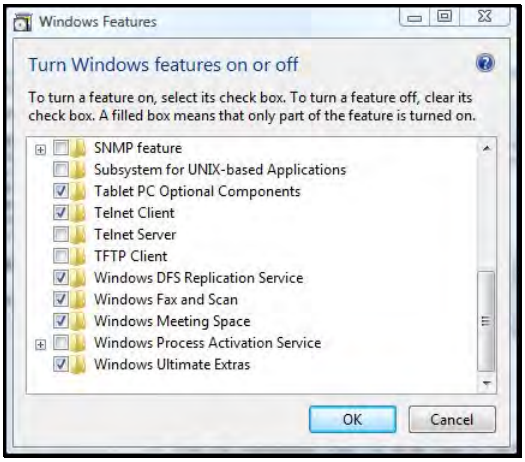
Logging Level This specifies the level of information to be logged and monitored (refer to Chapter 7 - Alerts and Logging).

Telnet Check to enable Telnet access to the serial port. When enabled, a Telnet client on a User or Administrator's computer can connect to a serial device attached to this serial port on the Console Server. The default port address is IP Address _ Port (2000 + serial port #) i.e. 2001 – 2048.

Telnet communications are unencrypted, so this protocol is generally recommended for local connections only. However, if the remote communications are being tunneled with SDT Connector, then Telnet can be used to securely access these attached devices (see Note below).

With Win2000/XP/NT you can run Telnet from the command prompt (cmd.exe). Vista comes with a Telnet client and server but they are not enabled by default. To enable Telnet, simply:

- Log in as Admin and go to Start/ Control Panel/Programs and Features
- Select Turn Windows Features On or Off, check the Telnet Client and click OK


Windows Features
Turn Windows features on or off
To turn a feature on, select its check box. To turn a feature off, clear its check box. A filled box means that only part of the feature is turned on.
SNMP feature
Subsystem for UNIX-based Applications
Tablet PC Optional Components
Telnet Client
Telnet Server
TFTP Client
Windows DFS Replication Service
Windows Fax and Scan
Windows Meeting Space
Windows Process Activation Service
Windows Ultimate Extras
OK
Cancel

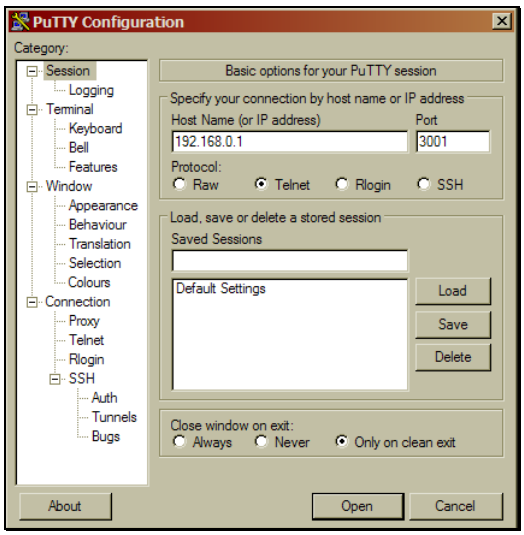
Note In Console Server mode, Users and Administrators can use *SDT Connector* to set up secure Telnet connections that are SSH tunneled from their client computers to the serial port on the Console Server with a simple point-and-click.

To use *SDT Connector* to access consoles on the Console Server serial ports, configure the *SDT Connector* with the Console Server as a *gateway*, then as a *host*. Now enable Telnet service on Port (2000 + serial port #) *i.e.* 2001–2048. Refer to *Chapter 6* for more details on using *SDT Connector* for Telnet and SSH access to devices attached to the Console Server serial ports.

You can also use standard communications packages like PuTTY to set a direct Telnet (or SSH) connection to the serial ports (refer to the Note below):

Note *PuTTY* also supports Telnet (and SSH). The procedure to set up a Telnet session is simple: Enter the Console Server's IP address as the 'Host Name (or IP address)'. Select 'Telnet' as the protocol and set the 'TCP port' to 2000 plus the physical serial port number (*i.e.* 2001 to 2048).

Click the 'Open' button. You may then receive a 'Security Alert' that the host's key is not cached. Choose 'yes' to continue. You will then be presented with the login prompt of the remote system connected to the serial port chosen on the Console Server. You can login as normal and use the host serial console screen.



PuTTY can be downloaded at http://www.tucows.com/preview/195286.html

SSH

It is recommended that the User or Administrator uses SSH as the protocol for connecting to serial consoles attached to the Console Server when communicating over the Internet or any other public network. This will provide an authenticated, encrypted connection between the SSH client program on the remote user's computer and the Console Server. The user's communication with the serial device attached to the Console Server is therefore secure.

It is recommended for Users and Administrators to use SDT Connector when making an SSH connection to the consoles on devices attached to the Console Server's serial ports. Configure the SDT Connector with the Console Server as a gateway, then as a host, and enable SSH service on Port (3000 + serial port #) i.e. 3001-3048 (refer to Chapter 6).

You can also use common communications packages, like PuTTY or SSHTerm to SSH connect directly to port address IP Address _ Port (3000 + serial port #) i.e. 3001–3048.

Alternately SSH connections can be configured using the standard SSH port 22. The serial port being accessed is then identified by appending a descriptor to the username. This syntax supports any of:

<username>:<portXX>

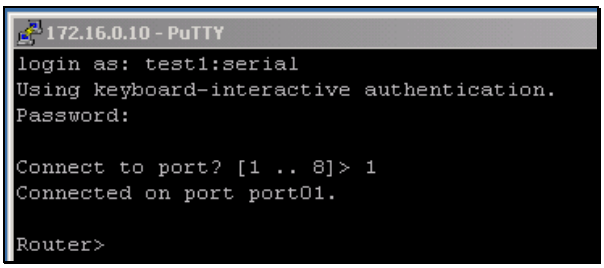
<username>:<port label>

<username>:<ttySX>

<username>:<serial>

So for a user named 'fred' to access serial port 2, when setting up the SSHTerm or the PuTTY SSH client, instead of typing username = fred and ssh port = 3002, the alternate is to type username = fred:port02 (or username = fred:ttyS1) and ssh port = 22.

Or, by typing username=fred:serial and ssh port = 22, the user is presented with a port selection option:



This syntax enables users to set up SSH tunnels to all serial ports with only a single IP port 22 having to be opened in their firewall/gateway.

TCP RAW TCP allows connections directly to a TCP socket. Communications programs such as PuTTY also support RAW TCP, however, this protocol would usually be used by a custom application. For RAW TCP, the default port address is IP Address _ Port (4000 + serial port #) i.e. 4001 – 4048.

RAW TCP also enables the serial port to be tunneled to a remote Console Server, so two serial port devices can be transparently interconnected over a network (see Chapter 4.1.6 – Serial Bridging).

RFC2217 Selecting RFC2217 enables serial port redirection on that port. For RFC2217, the default port address is IP Address _ Port (5000 + serial port #) i.e. 5001 – 5048.

You will also need to run serial port redirector software on your desktop computer. This software, which supports RFC2217 virtual com ports, is available commercially and as freeware, for Windows UNIX and Linux, and it allows you to use a serial device connected to the remote Console Server as if it were connected to your local serial port.

Unauthenticated Telnet Selecting Unauthenticated Telnet enables Telnet access to the serial port without requiring the user to provide credentials. When a user accesses the Console Server to Telnet to a serial port they are normally given a login prompt. However, with unauthenticated Telnet, they connect directly through to port with any Console Server login at all. This mode is mainly used when you have an external system (such as conserver) managing user authentication and access privileges at the serial device level.

For Unauthenticated Telnet, the default port address is IP Address _ Port (6000 + serial port #) i.e. 6001 – 6048.

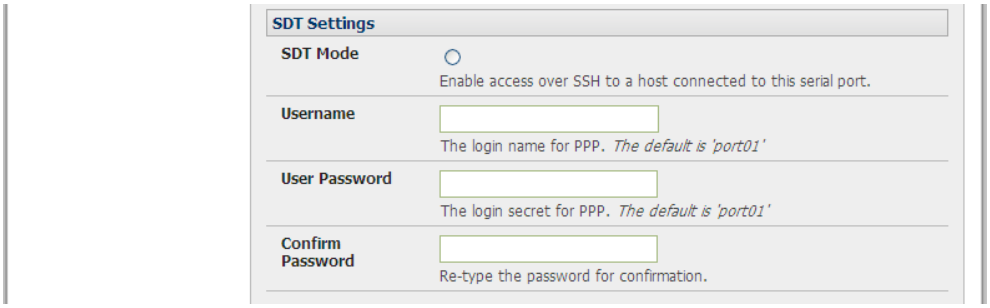
Accumulation Period By default, once a connection has been established for a particular serial port (such as a RFC2217 redirection or Telnet connection to a remote computer), then any incoming characters on that port are forwarded over the network on a character by character basis. The accumulation period changes this by specifying a period of time that incoming characters will be collected before being sent as a packet over the network.

Escape Character This enables you to change the character used for sending escape characters. The default is ~.

Single Connection This setting limits the port to a single connection, so if multiple users have access privileges for a particular port, only one user at a time can be accessing that port (i.e. port "snooping" is not permitted).

4.1.3 SDT Mode

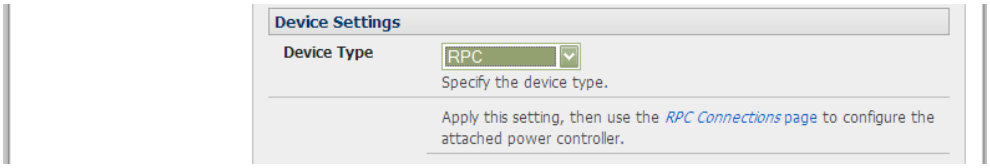
This setting allows port forwarding of LAN protocols such as RDP, VNC, HTPP, HTTPS, SSH and Telnet through to computers which are connected locally to the Console Server by their serial COM port. However such port forwarding requires a PPP link to be set up over this serial port.


SDT Settings
SDT Mode
Enable access over SSH to a host connected to this serial port.
Username
The login name for PPP. The default is 'port01'
User Password
The login secret for PPP. The default is 'port01'
Confirm Password
Re-type the password for confirmation.

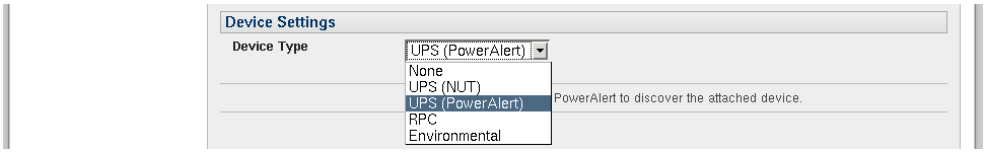
Refer to Chapter 6.6 - Using SDT Connector to Telnet or SSH connect to devices that are serially attached to the Console Server for configuration details.

4.1.4 Device (RPC, UPS, EMD) Mode

This mode configures the selected serial port to communicate with a serial controlled Uninterruptible Power Supply (UPS), serial Remote Power Controller/ Power Distribution Unit (RPC) or Environmental Monitoring Device (EMD).

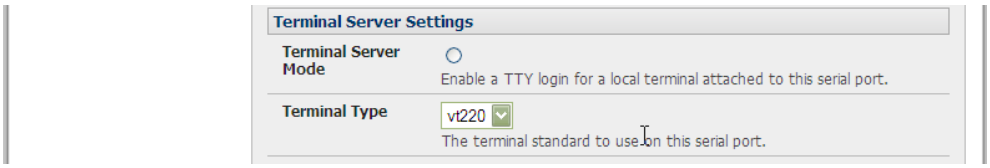

Device Settings
Device Type
RPC
Specify the device type.
Apply this setting, then use the RPC Connections page to configure the attached power controller.

- Select the desired Device Type (UPS, RPC or EMD).
- Proceed to the appropriate device configuration page (Serial & Network: UPS Connections, RPC Connection or Environmental) as detailed in Chapter 8 - Power & Environmental Management).
- The B092-016 Console Server also allows you to configure ports as UPS devices that PowerAlert will manage. PowerAlert will discover the attached UPS device and auto-configure. See www.tripplite.com/EN/support/PowerAlert/Downloads.cfm for a complete PowerAlert manual.



4.1.5 Terminal Server Mode

- Select Terminal Server Mode and the Terminal Type (vt220, vt102, vt100, Linux or ANSI) to enable a getty on the selected serial port.


Terminal Server Settings
Terminal Server Mode
Enable a TTY login for a local terminal attached to this serial port.
Terminal Type
vt220
The terminal standard to use on this serial port.

The getty will then configure the port and wait for a connection to be made. An active connection on a serial device is usually indicated by the Data Carrier Detect (DCD) pin on the serial device being raised. When a connection is detected, the getty program issues a login: prompt, and then invokes the login program to handle the actual system login.

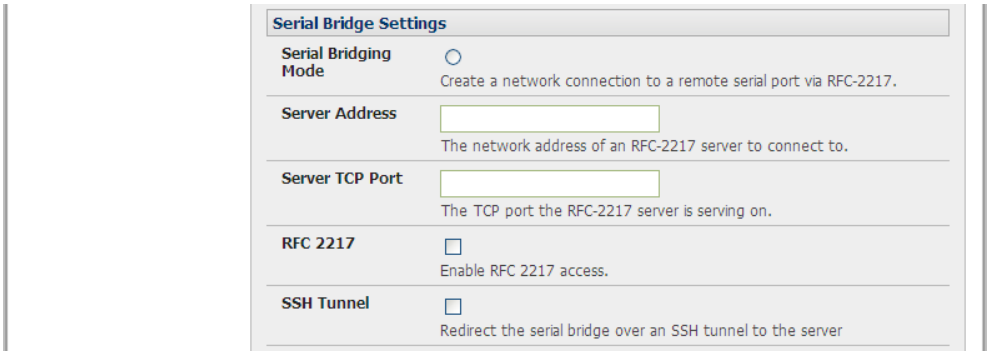
Note Selecting Terminal Server mode will disable Port Manager for that serial port, so data is no longer logged for alerts etc.

4.1.6 Serial Bridging Mode

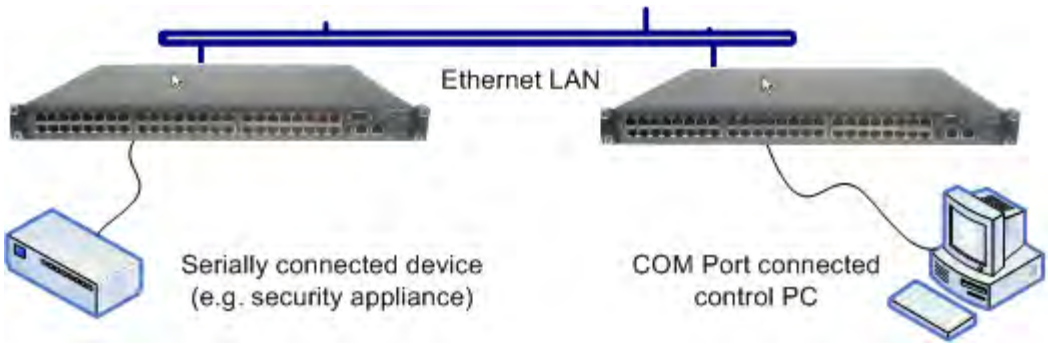
With serial bridging, the serial data on a nominated serial port on one Console Server is encapsulated into network packets and then transported over a network to a second Console Server, where it is then represented as serial data. So the two Console Servers effectively act as a virtual serial cable over an IP network.

One Console Server is configured to be the Server. The Server serial port to be bridged is set in Console Server mode with either RFC2217 or RAW enabled (as described in Chapter 4.1.2 – Console Server Mode).

For the Client Console Server, the serial port to be bridged must be set in Bridging Mode:


Serial Bridge Settings
Serial Bridging Mode
Create a network connection to a remote serial port via RFC-2217.
Server Address
The network address of an RFC-2217 server to connect to.
Server TCP Port
The TCP port the RFC-2217 server is serving on.
RFC 2217
Enable RFC 2217 access.
SSH Tunnel
Redirect the serial bridge over an SSH tunnel to the server

- Select Serial Bridging Mode and specify the IP address of the Server Console Server and the TCP port address of the remote serial port (for RFC2217 bridging this will be 5001-5048).
- By default, the bridging client will use RAW TCP so you must select RFC2217 if this is the Console Server mode you have specified on the server Console Server.

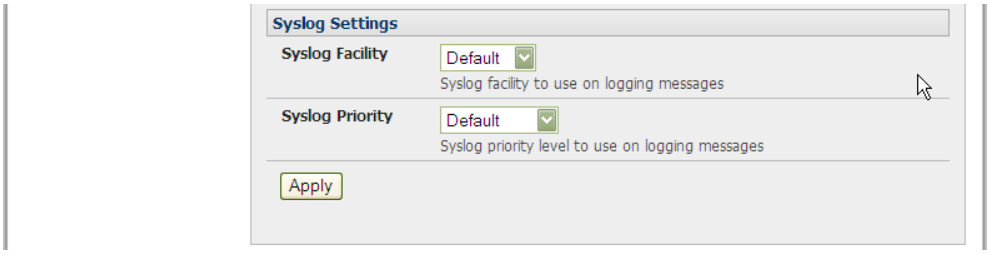


- You may secure the communications over the local Ethernet by enabling SSH however you will need to generate and upload keys (refer to Chapter 14 – Advanced Configuration).

4.1.7 Syslog

In addition to built-in logging and monitoring (which can be applied to serial-attached and network-attached management accesses, as covered in Chapter 7 - Alerts and Logging), the Console Server can also be configured to support the remote syslog protocol on a per serial port basis:

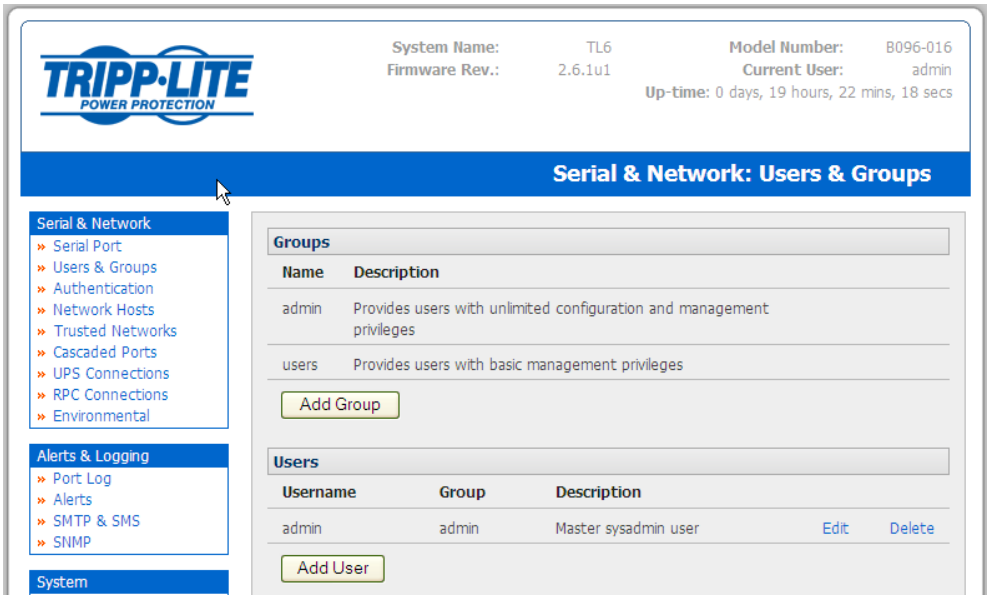
- Select the Syslog Facility/Priority fields to enable logging of traffic on the selected serial port to a syslog server; and to appropriately sort and action those logged messages (i.e. redirect them/ send alert email etc.).



For example if the computer attached to serial port 3 should never send anything out on its serial console port, the Administrator can set the Facility for that port to local0 (local0 .. local7 are meant for site local values), and the Priority to critical. At this priority, if the Console Server syslog server does receive a message, it will automatically raise an alert. Refer to Chapter 7.

4.2 Add/Edit Users

The Administrator uses this menu selection to set up, edit and delete users and to define the access permissions for each of these users.



Users can be authorized to access specified Console Server serial ports and specified network-attached hosts. These users can also be given full Administrator status (with full configuration and management and access privileges).

To simplify user setup, they can be configured as members of Groups. There are two Groups set up by default (admin and user).

1. Membership of the admin group provides the user with full Administrator privileges. The admin user (referred to in this manual as Administrator) can access the Console Server using any of the services which have been enabled in System: Services e.g. if only HTTPS has been enabled then the Administrator can only access the Console Server using HTTPS. However, once logged in, they can reconfigure the Console Server settings (e.g. to enabled HTTP/Telnet for future access). They can also access any of the connected Hosts or serial port devices using any of the services that have been enabled for these connections. However, since the Administrator can reconfigure the access services for any Host or serial port, only trusted users should have Administrator access.

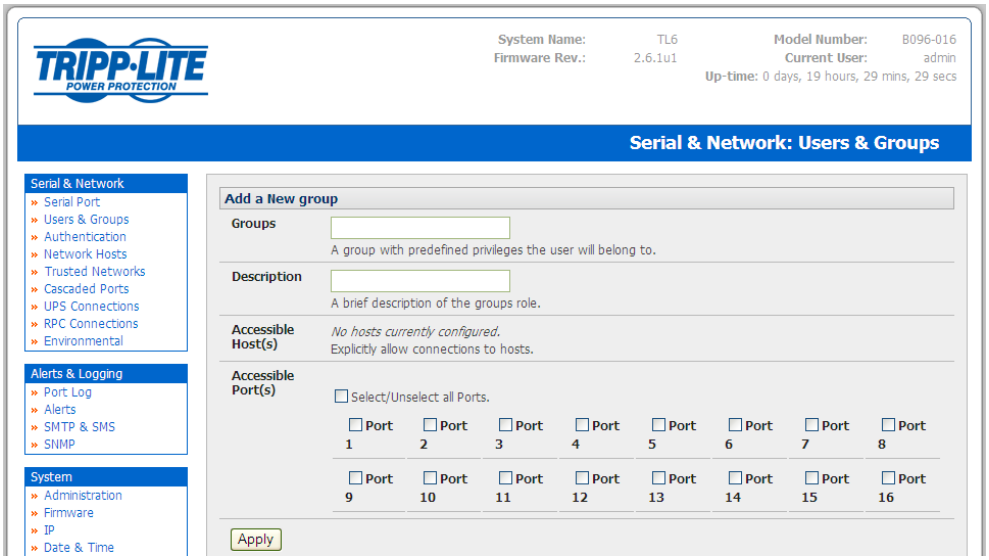
Note: For convenience the SDT Connector "Retrieve Hosts" function retrieves and auto-configures checked serial ports and checked hosts only, even for admin group users.

2. Membership of the user group provides the user with limited access to the Console Server and connected Hosts and serial devices. These Users can access only the Management section of the Management Console menu and they have no command line access to the Console Server. They also can only access those Hosts and serial devices that have been checked for them, using services that have been enabled.

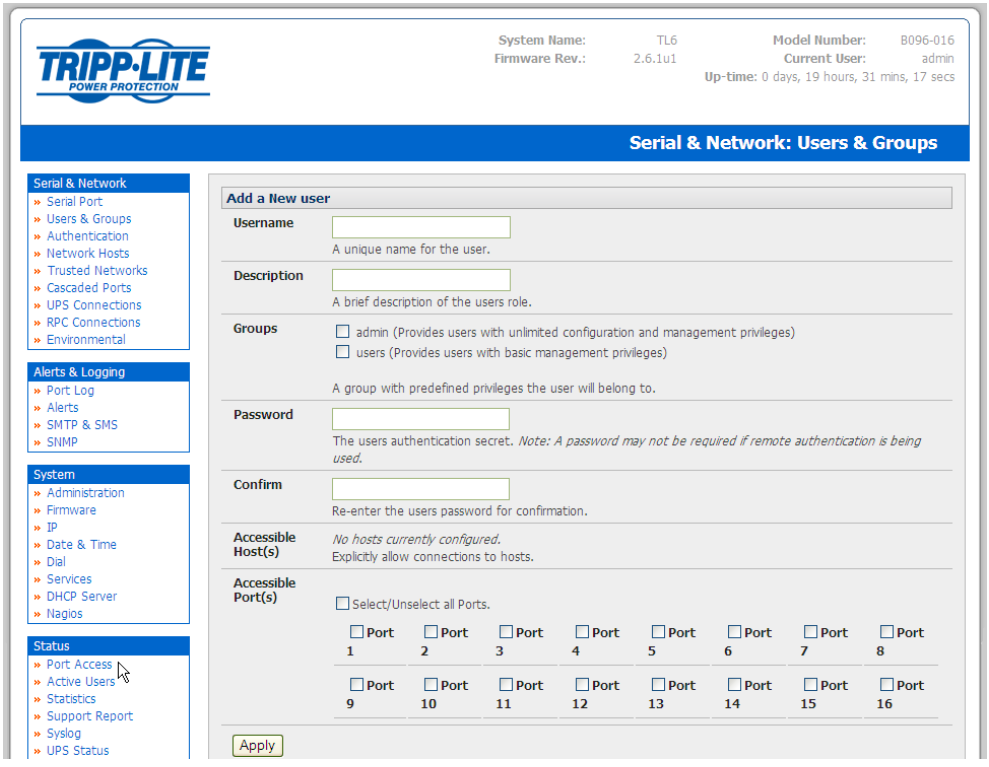
3. The Administrator can also set up additional Groups with specific serial port and host access permissions (same as Users). However users in these additional groups don't have any access to the Management Console menu nor to any command line access to the Console Server itself. Lastly the Administrator can also set up users who are not a member of any Groups and they will have the same access as users in the additional groups.

To set up new users and classify them as members of particular Groups:

- Select Serial & Network: Users & Groups to display the configured Groups and Users.
- Click Add Group to add a new Group.



- Add a Group name and Description for each new Group, then nominate Accessible Hosts and Accessible Ports to specify the serial ports and hosts you wish any users in this new Group to be able to access.
- Click Apply.
- Select Serial & Network: Users to display the configured users.
- Click Add User to add a new user.



- Add a Username and a confirmed Password for each new User. You may also include information related to the user (e.g. contact details) in the Description field.
- Nominate Accessible Hosts and Accessible Ports to specify which serial ports and which LAN connected hosts you wish the user to have access to.
- Specify which Group (or Groups) you wish the user to be a member of.
- Click Apply.

Your new user will now be able to access the nominated network devices and the devices attached to the nominated serial ports.

Note There are no specific limits on the number of users you can set up; nor on the number of users per serial port or host. Multiple users (Users and Administrators) can control/monitor one port or host. Similarly there are no specific limits on the number of Groups and each user can be a member of a number of Groups (in which case they take on the cumulative access privileges of each of those Groups). A user does not have to be a member of any Groups (but if the User is not even a member of the default *user* group then they will not be able to use the Management Console to manage ports).

Note that while there are no specific limits, the time to re-configure does increase as the number and complexity increases so we recommend the aggregate number if users and groups be kept under 250 (or 1000 for B092-016).

The Administrator can also edit the access settings for any existing users:

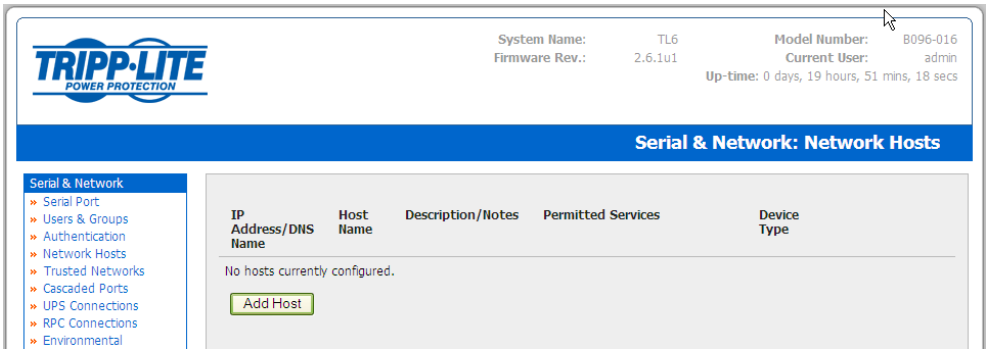
- Select Serial & Network: Users & Groups and click Edit for the User to be modified.

4.3 Authentication

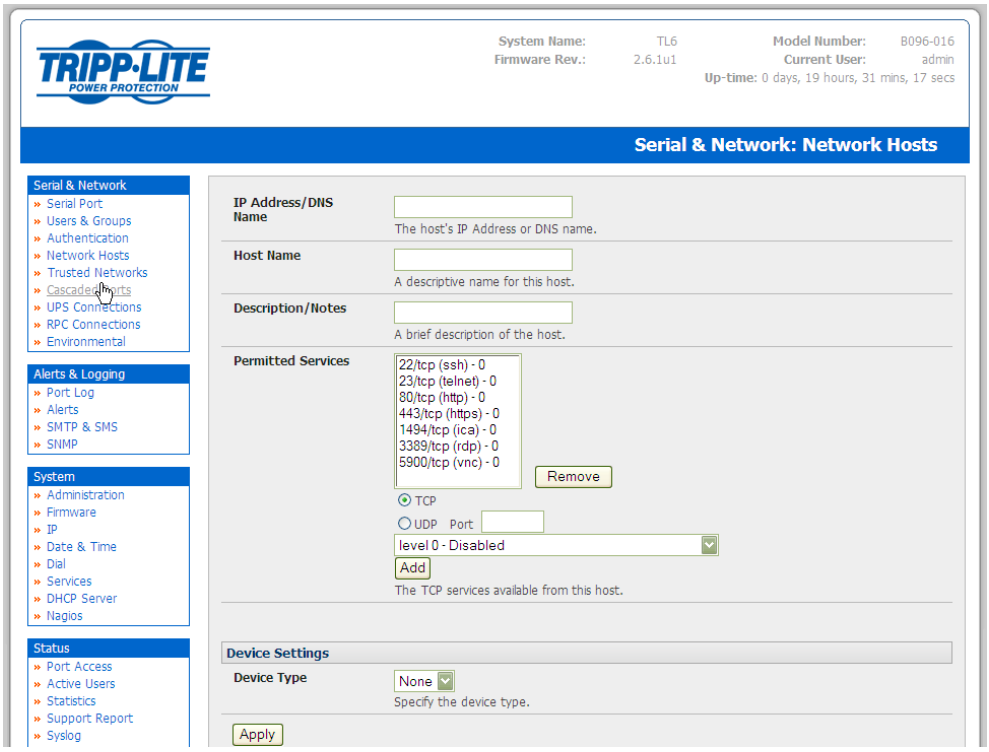
Refer to Chapter 9.1 - Remote Authentication Configuration for authentication configuration details.

4.4 Network Hosts

To access a locally networked computer or appliances (referred to as a Host), you must identify the network connected Host; and then specify the TCP or UDP ports/services that are permitted to be used for communicating to that Host:



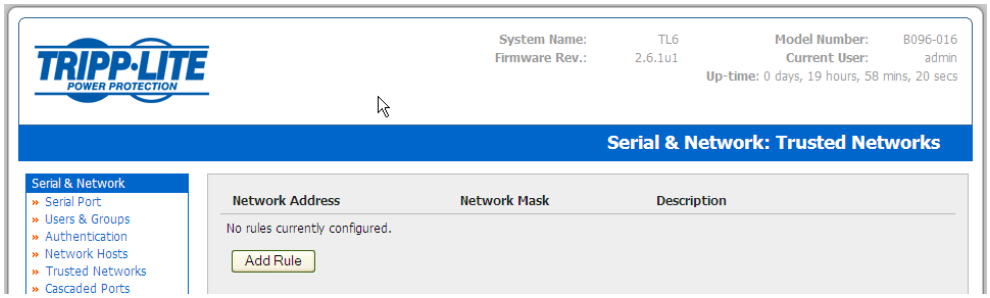
- Selecting Serial & Network: Network Hosts presents all the network connected Hosts that have been enabled for access, and the related access TCP ports/services.
- Click Add Host to enable access to a new Host (or select Edit to update the settings for existing Host).



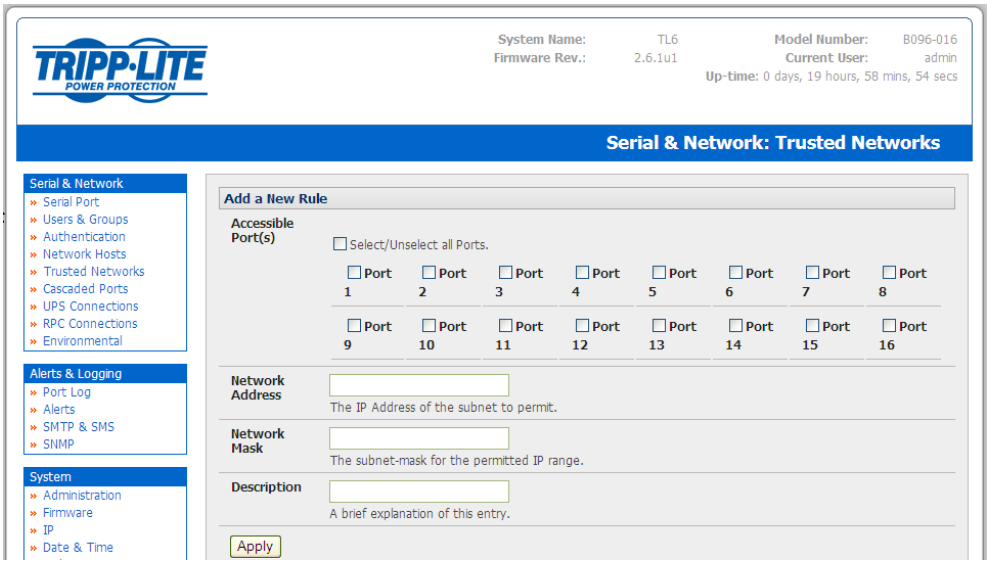
- Enter the IP Address or DNS Name of the new network connected Host (and optionally enter a Description).
- Add or edit the Permitted Services (or TCP/UDP port numbers) that are authorized to be used in controlling this host. Only these permitted services will be port forwarded through to the Host. All other services (TCP/UDP ports) will be blocked.
- If the Console Server has been configured with distributed Nagios monitoring enabled then you will also be presented with Nagios Settings options to enable nominated services on the Host to be monitored (refer to Chapter 10 – Nagios Integration).
- The Logging Level specifies the level of information to be logged and monitored for each Host access (refer to Chapter 7 - Alerts and Logging).
- If the Host is a networked server with IPMI power control, then the Administrator can enable users (Users and Administrators) to remotely cycle power and reboot (refer to Chapter 8.2 - Configuring IPMI Power Management).
- Click Apply.

4.5 Trusted Networks

The Trusted Networks facility gives you the option to nominate specific IP addresses that users (Administrators and Users) must be located at in order to have access to Console Server serial ports:



- Select Serial & Network: Trusted Networks.
- To add a new trusted network, select Add Rule.



- Select the Accessible Port(s) that the new rule is to be applied to.
- Then enter the Network Address of the subnet to be permitted access.
- Then specify the range of addresses that are to be permitted by entering a Network Mask for that permitted IP range e.g.
  - To permit all the users located with a particular Class C network (204.15.5.0 say) connection to the nominated port, add the following Trusted Network New Rule:

Network IP Address	204.15.5.0
Subnet Mask	255.255.255.0

  - If you want to permit only the one user who is located at a specific IP address (204.15.5.13 say) to connect:

Network IP Address	204.15.5.0
Subnet Mask	255.255.255.255

- If however you want to allow all the users operating from within a specific range of IP addresses (say any of the thirty addresses from 204.15.5.129 to 204.15.5.158) to be permitted connection to the nominated port:

Host /Subnet Address	204.15.5.128
Subnet Mask	255.255.255.224

➢ Click Apply.

Note The above Trusted Networks will limit access by Users and the Administrator to the console serial ports. However they do not restrict access by the Administrator to the Console Server itself or to attached hosts. To change the default settings for this access, you will to need to edit the *IP tables* rules as described in *Chapter 14 - Advanced.*

4.6 Serial Port Cascading

Cascaded Ports enables you to cluster distributed Console Servers so that a large number of serial ports (up to 1000) can be configured and accessed through one IP address and managed through the one Management Console. One Console Server, the Master, controls other Console Servers as Slave units and all the serial ports on the Slave units appear as if they are part of the Master.

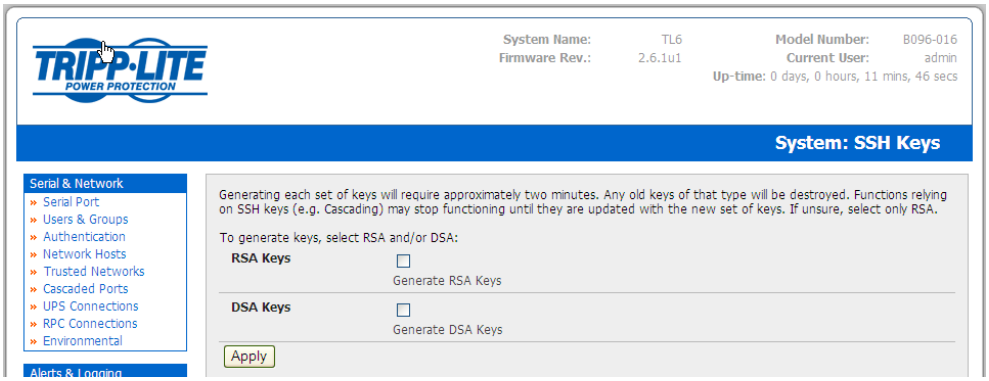
Each Slave connects to the Master with an SSH connection using public key authentication. So the Master accesses each Slave using an SSH key pair, rather than using passwords, ensuring secure authenticated communications. So the Slave Console Server units can be distributed locally on a LAN or remotely over public networks around the world.

4.6.1 Automatically Generate and Upload SSH Keys

To set up public key authentication, you must first generate an RSA or DSA key pair and upload them into the Master and Slave Console Servers. This can all be done automatically from the Master:

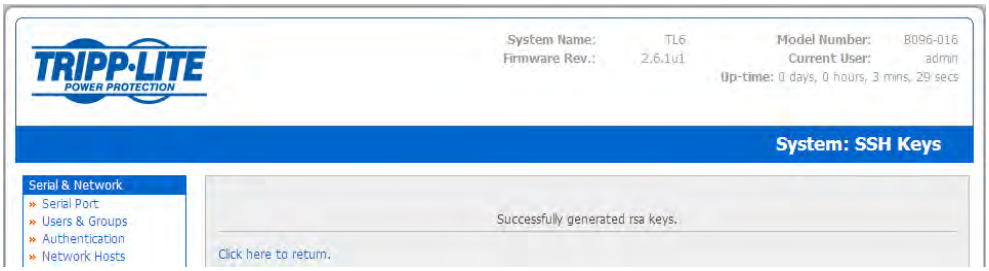
➢ Select System: Administration on Master's Management Console.

➢ Check Generate SSH keys automatically and click Apply.


TRIPP·LITE
POWER PROTECTION
System Name: TL6
Firmware Rev.: 2.6.1u1
Model Number: B096-016
Current User: admin
Up-time: 0 days, 0 hours, 11 mins, 46 secs
System: SSH Keys
Serial & Network
» Serial Port
» Users & Groups
» Authentication
» Network Hosts
» Trusted Networks
» Cascaded Ports
» UPS Connections
» RPC Connections
» Environmental
Alerts & Logging
Generating each set of keys will require approximately two minutes. Any old keys of that type will be destroyed. Functions relying on SSH keys (e.g. Cascading) may stop functioning until they are updated with the new set of keys. If unsure, select only RSA.
To generate keys, select RSA and/or DSA:
RSA Keys
Generate RSA Keys
DSA Keys
Generate DSA Keys
Apply

Now select whether to generate the keys using RSA and/or DSA (if unsure, select only RSA). Generating each set of keys will require approximately two minutes and the new keys will destroy any old keys of that type that may previously been uploaded. Also while the new generation is under way on the master, functions relying on SSH keys (e.g. cascading) may stop functioning until they are updated with the new set of keys. To generate keys:

- Select RSA Keys and/or DSA Keys.
- Click Apply.



- Once the new keys have been successfully generated simply Click here to return and the keys will automatically be uploaded to the Master and connected Slaves.

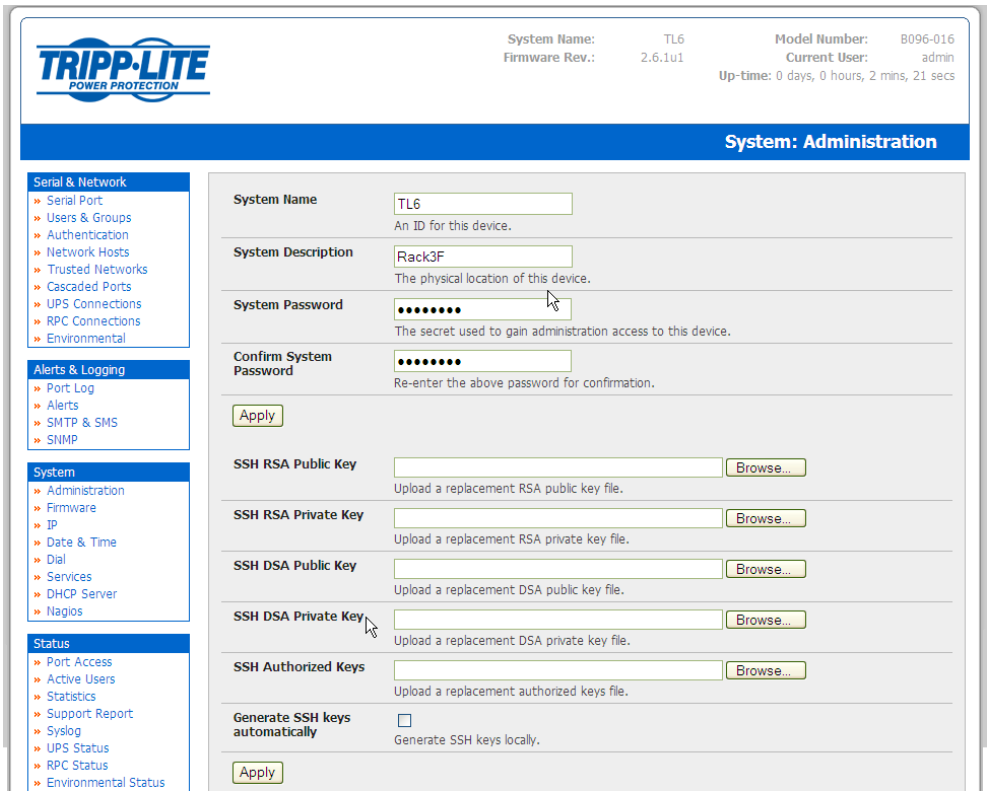
4.6.2 Manually Generate and Upload SSH Keys

Alternately if you have a RSA or DSA key pair, you can manually upload them to the Master and Slave Console Servers.

Note If you do not already have an RSA or DSA key pair and you do not wish to use it, you will need to create a key pair using *ssh-keygen, PuTTYgen* or a similar tool as detailed in Chapter 15.6.

To manually upload the key public and private key pair to the Master Console Server:

- Select System: Administration on Master's Management Console.
- Browse to the location you have stored RSA (or DSA) Public Key and upload it to SSH RSA (DSA) Public Key.
- Browse to the stored RSA (or DSA) Private Key and upload it to SSH RSA (DSA) Private Key.
- Click Apply.



Next, you must register the Public Key as an Authorized Key on the Slave. In the simple case with only one Master with multiple Slaves, you need only upload the one RSA or DSA public key for each Slave.

Note The use of key pairs can be confusing because in many cases one file (Public Key) fulfills two roles – Public Key and Authorized Key. For a more detailed explanation, refer to the *Authorized Keys* section of *Chapter 15.* Also refer to this chapter if you need to use more than one set of Authorized Keys in the Slave.

- Select System: Administration on the Slave's Management Console.
- Browse again to the stored RSA (or DSA) Public Key and upload it to Slave's SSH Authorized Key.
- Click Apply.

The next step is to Fingerprint each new Slave-Master connection. This once-off step will validate that you are establishing an SSH session with the correct target. On the first connection the Slave will receive a fingerprint from the Master which will be used on all future connections:

- To establish the fingerprint, first log in the Master server as root and establish an SSH connection to the Slave remote host:

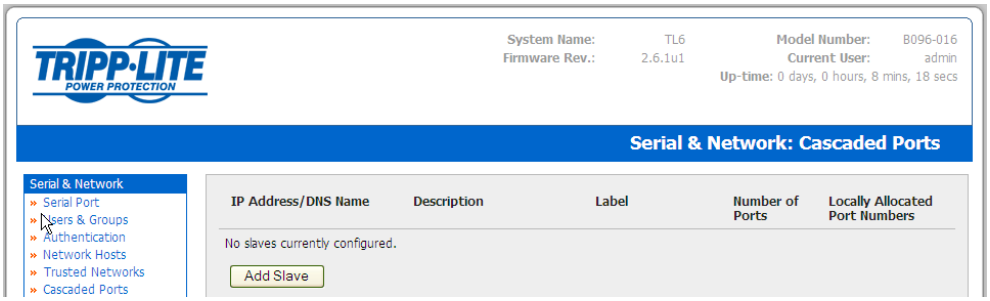
  # ssh remhost

Once the SSH connection has been established, you will be asked to accept the key. Answer yes and the fingerprint will be added to the list of known hosts. For more details on Fingerprinting, refer to Chapter 15.6.

- If you are asked to supply a password, then there has been a problem with uploading keys. The keys should remove any need to supply a password.

4.6.3 Configure the Slaves and their Serial Ports

You can now begin setting up the Slaves and configuring Slave serial ports from the Master Console Server:



- Select Serial & Network: Cascaded Ports on the Master's Management Console.
- To add clustering support select Add Slave.

Note You will be prevented from adding any Slaves until you have automatically or manually generated SSH keys:

To define and configure a Slave:

- Enter the remote IP Address (or DNS Name) for the Slave Console Server.
- Enter a brief Description and a short Label for the Slave (use a convention that enables effective management of large networks of clustered Console Servers and the connected devices).
- Enter the full number of serial ports on the Slave unit in Number of Ports.
- Click Apply. This will establish the SSH tunnel between the Master and the new Slave.

The Serial & Network: Cascaded Ports menu displays all the Slaves and the port numbers that have been allocated on the Master. If the Master Console Server has 16 ports of its own, then ports 1-16 are pre-allocated to the Master. So the first Slave added will be assigned port number 17 and onwards.

Once you have added all the Slave Console Servers, the Slave serial ports and the connected devices are configurable and accessible from the Master's Management Console menu, and accessible through the Master's IP address.

- Select the appropriate Serial & Network: Serial Port and Edit to configure the serial ports on the Slave.
- Select the appropriate Serial & Network: Users & Groups to add new users with access privileges to the Slave serial ports (or to extend existing users access privileges).
- Select the appropriate Serial & Network: Trusted Networks to specify network addresses that can access nominated Slave serial ports.
- Select the appropriate Alerts & Logging: Alerts to configure Slave port Connection, State Change or Pattern Match alerts.
- The configuration changes made on the Master are propagated out to all the Slaves when you click Apply.

4.6.4 Managing the Slaves

The Master is in control of the Slave serial ports. So, for example, if you change a User's access privileges or edit any serial port setting on the Master, the updated configuration files will be sent out to each Slave in parallel. Each Slave will then automatically make changes to their local configurations (and only make those changes that relate to its particular serial ports).

You can still use the local Slave Management Console to change the settings on any Slave serial port (such as to alter the baud rates). However these changes will be overwritten next time the Master sends out a configuration file update.

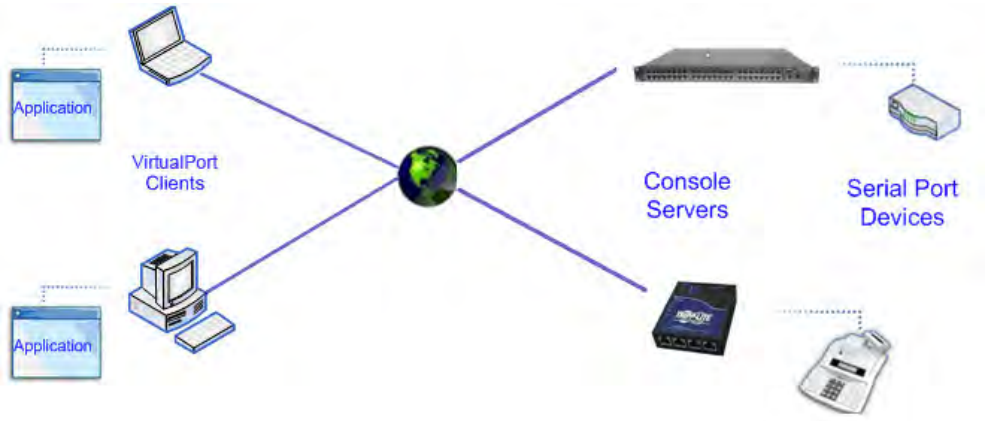
Also while the Master is in control of all Slave serial port related functions, it is not master over the Slave network host connections or over the Slave Console Server system itself.

So Slave functions such as IP, SMTP & SNMP Settings, Date &Time, DHCP server must be managed by accessing each Slave directly and these functions are not overwritten when configuration changes are propagated from the Master. Similarly, the Slave's Network Host and IPMI settings have to be configured at each Slave.

Also, the Master's Management Console provides a consolidated view of the settings for its own and all the Slave's serial ports. However, the Master does not provide a fully consolidated view. For example, if you want to find out who is logged in to cascaded serial ports from the Master, you'll see that Status: Active Users only displays those users active on the Master's ports, so you may need to write custom scripts to provide this view. This is covered in Chapter 11.

4.7 Serial Port Redirection

Tripp Lite's VirtualPort software delivers the virtual serial port technology your Windows applications need to open remote serial ports and read the data from serial devices that are connected to your Console Server.



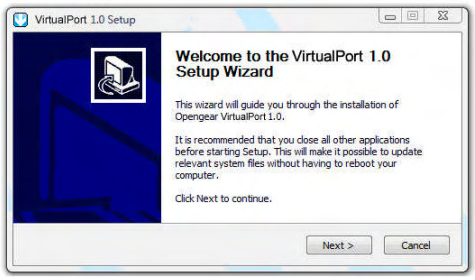
VirtualPort is supplied with each B096-016 / B096-048 Console Server Management Switch or B092-016 Console Server with PowerAlert or B095-003-1E-M / B095-004-1E Console Server.

You are licensed to install VirtualPort on one or more computers for accessing any serial device connected to any Tripp Lite Console Server port.

4.7.1 Install VirtualPort Client

VirtualPort is fully compatible with 32-bit and 64-bit versions of Windows NT 4.x, Windows XP, Windows 2000, Windows 2003, Windows 2008, Windows Vista and 64-bit and Windows 7. The installation process is simple.

- The VirtualPort_setup.exe program is included on the CD supplied with your Console Server (or a copy can be freely downloaded from the ftp site). Double click the VirtualPort_setup.exe file to start the installation process.

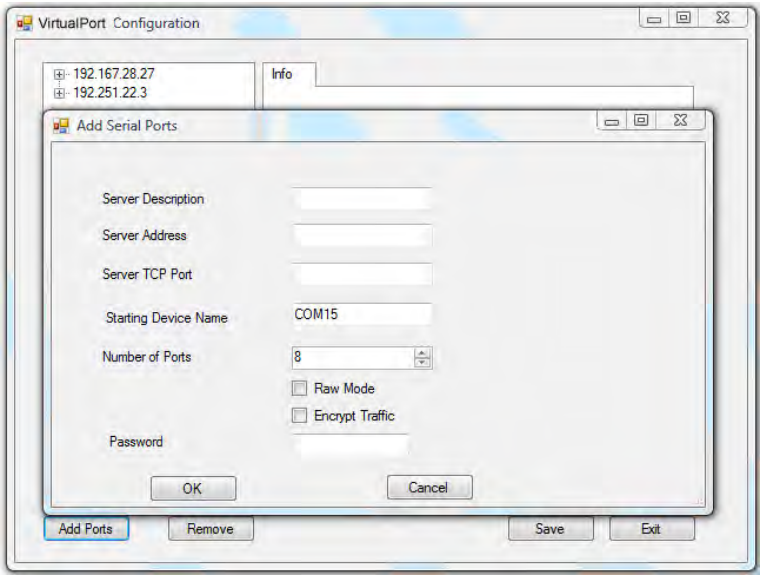

VirtualPort 1.0 Setup
Welcome to the VirtualPort 1.0 Setup Wizard
This wizard will guide you through the installation of Opengear VirtualPort 1.0.
It is recommended that you close all other applications before starting Setup. This will make it possible to update relevant system files without having to reboot your computer.
Click Next to continue.
Next >
Cancel

- Read the License Agreement then follow the prompts to select the destination path and choose the shortcuts you wish to create. Once the installer completes, you will have a working VirtualPort client installed on your machine and an icon on your desktop.
- Click the VirtualPort icon on your desktop to start the client.

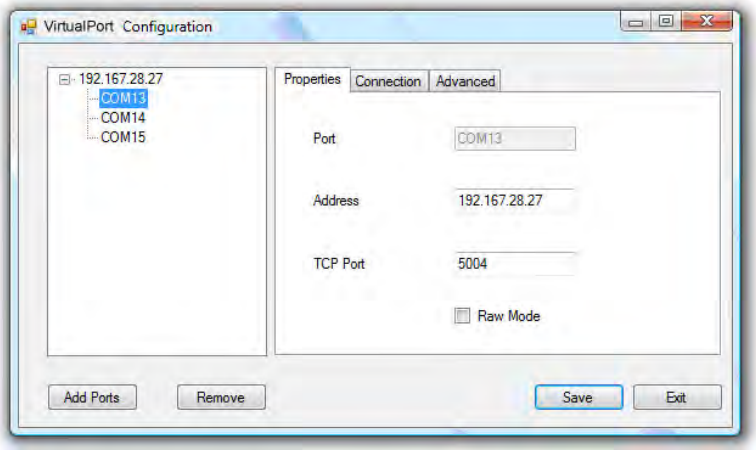
4.7.2 Configure the VirtualPort Client

Creating the VirtualPort client connection will initiate a virtual serial port data redirection to the remote Console Server using TCP/IP protocol.

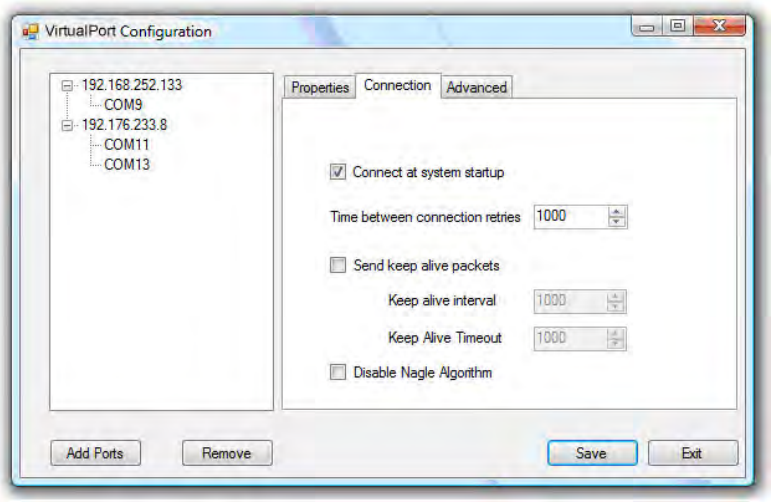
- Click on Add Ports.
- Specify a name to identify this connection in the "Server Description " tab.



- Enter the Console Server's IP address (or network name).
- Enter the Server TCP Port number that matches the port you have configured for the serial device on the remote Console Server. Ensure this port isn't blocked by a firewall.
    - Telnet RFC2217 mode is configured by default so the range of port numbers available on a 16-port console server would be 5001-5016
    - Alternately check RAW mode (4001- 4048 on a 48 port console server)
    - Select Encrypted to enable SSL/TLS encryption of the data going to the port. You will need to enter a Password
- Select the starting COM port (COM1 to COM4096).
- Specify the number of ports you want to add. Sequential port numbers will be assigned automatically. If a COM port # is already being used by other applications, that # will be skipped.
- Click OK to add the specified COM ports.



- To configure a COM port you have created, simply click on the desired COMx label in the left hand menu tree.
- In the Properties window you can edit the IP address or TCP Port to be used to connect to that COM port.
- You can then configure the COM port in the Connection and Advanced windows:



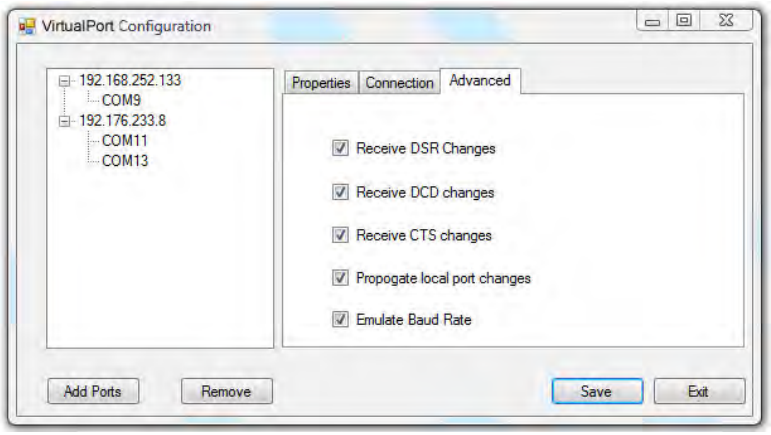
- Connect at system startup—When enabled VirtualPort will try to connect to the Console Server when the VirtualPort service starts (as opposed to waiting for the application to open the serial port before initiating the connection to the Console Server).

- The Time between connection retries specifies the number of seconds between TCP connection retries after a client-initiated connection failure. Valid values are 1-255. (The default is 1 second and VirtualPort will continue attempting to reconnect forever to the Console Server at this interval.)

- The Send keep-alive packets option tests if the TCP connection is still up when no data has been sent for a while. This is done by sending keep-alive messages. Select this option and specify a period of time (in milliseconds) after which VirtualPort sends a command to the remote Console Server end in order to verify connection's integrity and keep the connection alive.

- The Keep-Alive Interval specifies the number of seconds to wait on an idle connection before sending a keep-alive message. The default is 1 second. The Keep-Alive Timeout specifies how long VirtualPort should wait for a keep alive response before timing out the connection.

- Disable Nagle Algorithm — the Nagle Algorithm is enabled by default and it reduces the number of small packets sent by VirtualPort across the network.



- Check Receive DSR/DCD/CTS changes if the flow control signal status from the physical serial port on Console Server is to be reflected back to the Windows COM port driver (as some serial communications applications prefer to run without any hardware flow control, i.e. in “two wire” mode).

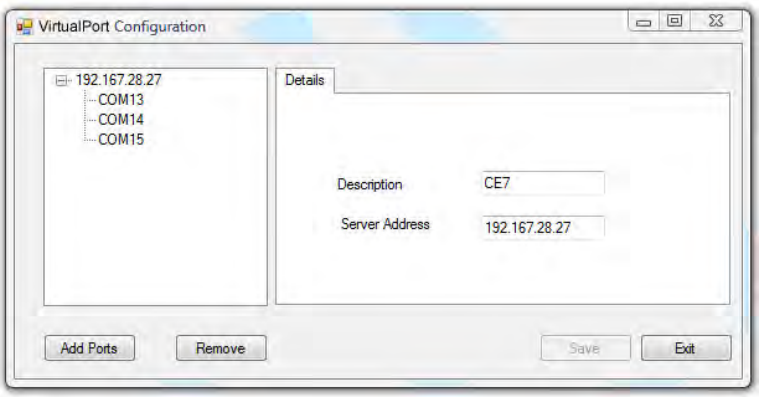
- The Propagate local port changes allows complete serial device control by the Windows application so it operates exactly like a directly connected serial COM port. It provides a complete COM port interface between the attached serial device and the network, providing hardware and software flow control. So the baud rate, etc. of the remote serial port is controlled by the settings for that COM port on Windows computer. If not selected then the port serial configuration parameters are set on the Console Server.

- With the Emulate Baud Rate selected VirtualPort will only send data out at the baud rate configured by the local Application using the COM port.

4.7.3 To Remove a Configured Port

At any stage you can delete a single configured COM port, or delete the Console Server connection (and all the COM ports configured on that console server):

- Select the console server or COM port on the left hand menu and click the Remove button.



4.7.4 Configure the Remote Serial Device Connection

Ensure the remote serial device is connected to your remote Console Server. Then configure the serial port as detailed in the User Guide:

- Set the RS232 Common Settings (e.g. baud rate).
- Select Console server mode and specify the appropriate protocol to be used:
    - RAW TCP allows connections directly to a TCP socket and the default TCP port address is 4000 + serial port # (i.e. the address of the second serial port is IP Address _ 4002)
    - RFC2217 enables serial port redirection on that port and the default port address is IP Address Port (5000 + serial port #) i.e. 5001 – 5048 on a 48 port Console Server
    - VirtualPort Secure mode enables encrypted communication (This feature will be available mid 2010)

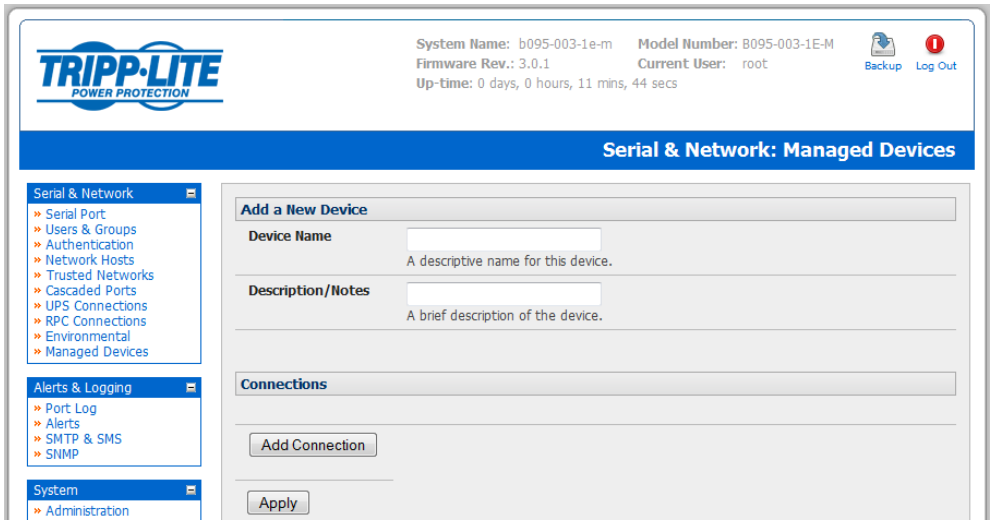
4.8 Managed Devices (B095-004/003 only)

Managed Devices presents a consolidated view of all the connections to a device that can be accessed and monitored through the Console Server.

Note The Managed Devices feature was introduced with Revision 3.0.1 firmware so is only currently available on B095-004-1E / B095-003-1E-M Console Servers.

To view the connections to the devices:

- Select Serial&Network: Managed Devices.



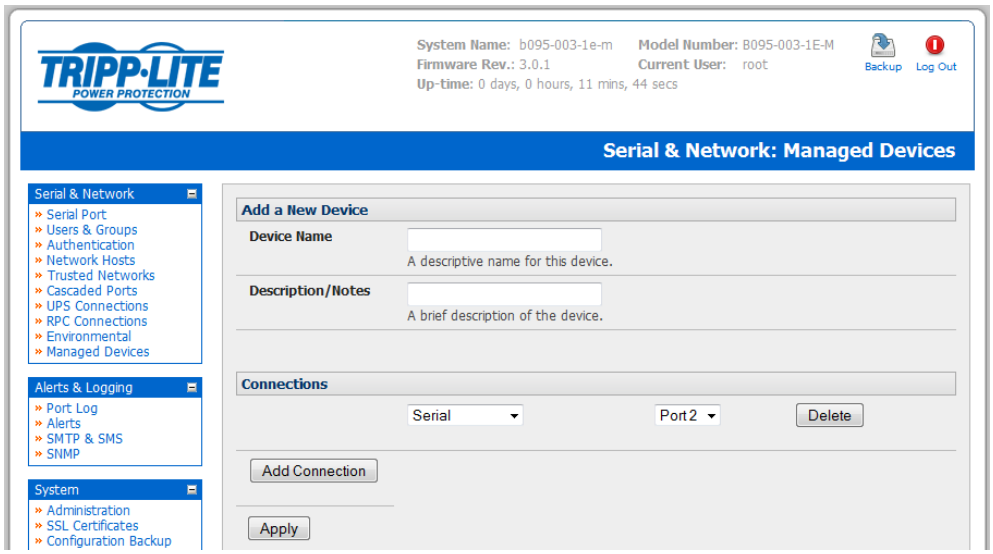
This screen displays all the Managed Device with their Description/Notes and lists of all the configured Connections i.e. Serial Port # (if serially connected) or USB (if USB connected); IP address (if network connected); Power PDU/outlet details (if applicable) and any UPS connections.

Many Devices such as servers will commonly have more than one power connections (e.g. dual power supplied) and more than one network connection (e.g. for BMC/service processor).

All users can view (but not edit) these Managed Device connections by selecting Manage: Devices. The Administrator can edit and add/delete these Managed Devices and their connections.

To edit an existing device and add a new connection:

- Select Edit on the Serial&Network: Managed Devices and click Add Connection.
- Select the connection type for the new connection (Serial, Network Host, UPS or RPC) and then select the specific connection from the presented list of configured unallocated hosts/ports/outlets.



To add a new network connected Managed Device:

- The Administrator adds a new network connected Managed Device using Add Host on the Serial&Network: Network Host menu. This automatically creates a corresponding new Managed Device (as covered in Section 4.4 - Network Hosts).
- When adding a new network connected RPC or UPS power device, set up a Network Host, designate it as RPC or UPS, then go to RPC Connections (or UPS Connections) to configure the relevant connection. Again the corresponding new Managed Device (with the same Name /Description as the RPC/UPS Host) is not created until this connection step is completed (refer Chapter8 - Power and Environment).

Note The outlet names on this newly created PDU will by default be “Outlet 1” “Outlet 2”. When you connect a particular Managed Device (that draws power from the outlet), the outlet will then take up the name of the powered Managed Device.

To add a new serially connected Managed Device:

- Configure the serial port using the Serial&Network: Serial Port menu (refer Section 4.1 - Configure Serial Port).
- Select Serial&Network: Managed Devices and click Add Device.
- Enter a Device Name and Description for the Managed Device.
- Click Add Connection and select Serial and the Port that connects to the Managed Device.
- To add a UPS/RPC power connection or network connection or another serial connection click Add Connection.
- Click Apply.

Note To set up a new serially connected RPC UPS or EMD device, configure the serial port, designate it as a Device then enter a Name and Description for that device in the **Serial & Network: RPC Connections** (or **UPS Connections** or **Environmental**). When applied, this will automatically create a corresponding new Managed Device with the same Name /Description as the RPC/UPS Host (refer *Chapter8 - Power and Environment).*

Also all the outlet names on the PDU will by default be “Outlet 1” “Outlet 2”. When you connect a particular Managed Device (that draws power from the outlet), the outlet will then take up the name of the powered Managed Device.

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5. FAILOVER AND OUT-OF-BAND ACCESS

Introduction

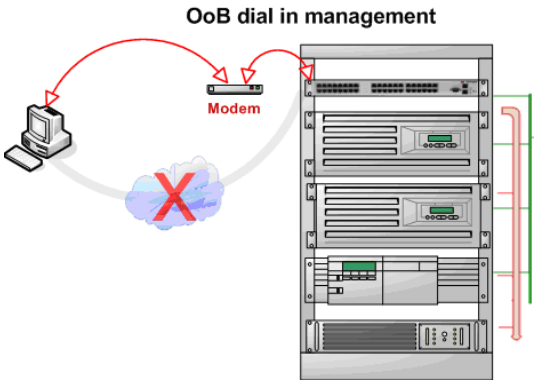
The Console Server has a number of failover and out-of-band access capabilities to ensure availability in the event there are difficulties in accessing the Console Server through the principal network path. This chapter covers:

- Out-of-band (OoB) access from a remote location using dial-up modem
- Out-dial failover
- OoB access using an alternate broadband link (B096-048/016 models only)
- Broadband failover

5.1 OoB Dial-In Access

To enable OoB dial-in access, first set up the Console Server configuration for dial-in PPP access. Once the Console Server is so configured, it will wait for an incoming connection from a dial-in at a remote site.

Then remote Administrator's must be configured to dial-in and must establish a network connection to the Console Server.



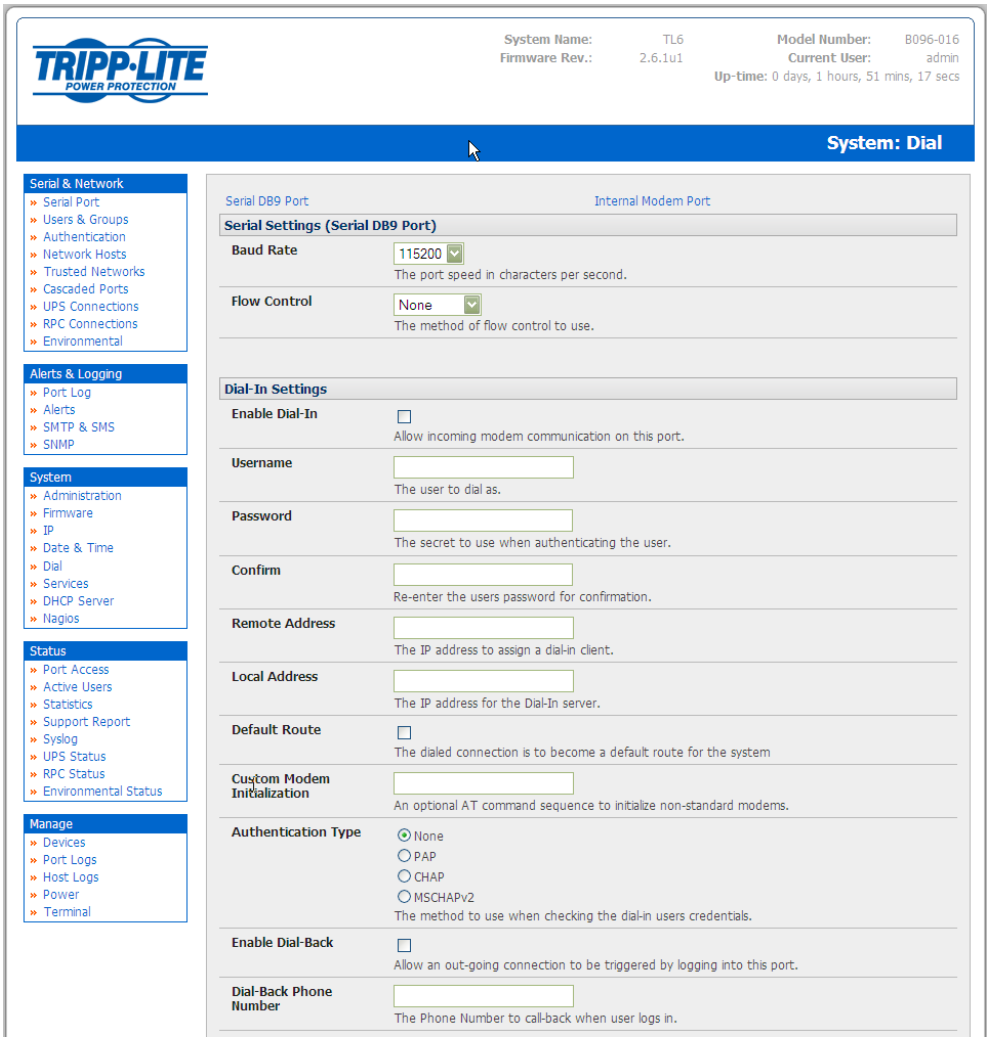
Note The B096-048/016 and B095-003-M Console Servers have an internal modem for dial-up OoB access.

The B092-016 Console Server needs an external modem to be attached via a serial cable to its DB9 port.

On the B095-004 Console Server, the four serial ports are all configured by default as RJ serial Console Server ports. However Port 1 can be configured to be the Local Console/Modem port to enable the attachment of an external modem.

5.1.1 Configure Dial-In PPP

To enable dial-in PPP access on the Console Server modem port/ internal modem:



- Select the System: Dial menu option and the port to be configured (Serial DB9 Port or Internal Modem Port).

Note The Console Server's console/modem serial port is set by default to 115200 baud, No parity, 8 data bits and 1 stop bit, with software (Xon-Xoff) flow control enabled. You can modify the baud rate and flow control using the Management Console. You can further configure the console/modem port settings by editing */etc/mgetty.config* files as described in *Chapter 14.*

- Select the Baud Rate and Flow Control that will communicate with the modem.
- Check the Enable Dial-In Access box.
- Enter the User name and Password to be used for the dial-in PPP link.
- In the Remote Address field, enter the IP address to be assigned to the dial-in client. You can select any address for the Remote IP Address. However, it and the Local IP Address must both be in the same network range (e.g. 200.100.1.12 and 200.100.1.67).

- In the Local Address field, enter the IP address for the Dial-In PPP Server. This is the IP address that will be used by the remote client to access Console Server once the modem connection is established. Again, you can select any address for the Local IP Address but both must be in the same network range as the Remote IP Address.
- The Default Route option enables the dialed PPP connection to become the default route for the Console Server.
- The Custom Modem Initialization option allows a custom AT string modem initialization string to be entered (e.g. AT&C1&D3&K3).
- Then select the Authentication Type to be applied to the dial-in connection. The Console Server uses authentication to challenge Administrators who dial-in to the Console Server. (For dial-in access, the username and password received from the dial-in client are verified against the local authentication database stored on the Console Server). The Administrator must also have their client computer configured to use the selected authentication scheme. Select PAP CHAP MSCHAPv2 or None and click Apply.

  None — With this selection, no username or password authentication is required for dial-in access. This is not recommended.

  PAP — Password Authentication Protocol (PAP) is the usual method of user authentication used on the internet: sending a username and password to a server where they are compared with a table of authorized users. Whilst most common, PAP is the least secure of the authentication options.

  CHAP — Challenge-Handshake Authentication Protocol (CHAP) is used to verify a user's name and password for PPP Internet connections. It is more secure than PAP, the other main authentication protocol.

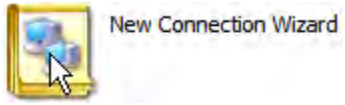
  MSCHAPv2 — Microsoft Challenge Handshake Authentication Protocol (MSCHAP) is authentication for PPP connections between a computer using a Microsoft Windows operating system and a network access server. It is more secure than PAP or CHAP, and is the only option that also supports data encryption.
- Console Servers all support dial-back for additional security. Check the Enable Dial-Back box and enter the phone number to be called to re-establish an OoB link once a dial-in connection has been logged.

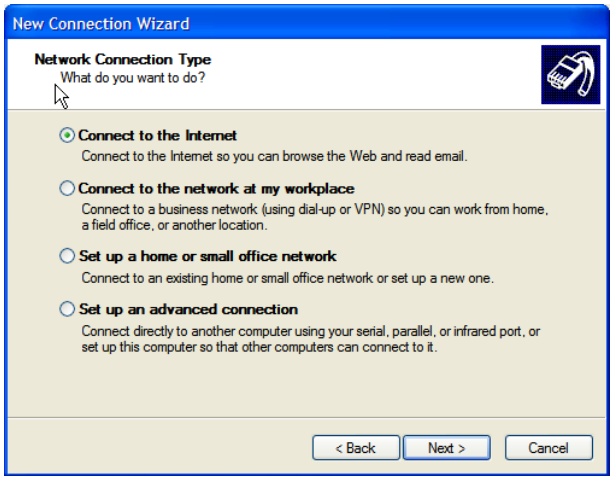
5.1.2 Using SDT Connector Client for Dial-In

Administrators can use their SDT Connector client to set up secure OoB dial-in access to all their remote Console Servers. With a point and click you can initiate a dial-up connection. Refer to Chapter 6.5.

5.1.3 Set Up Windows XP/ 2003/Vista/7 Client for Dial-In

- Open Network Connections in Control Panel and click the New Connection Wizard.




New Connection Wizard
Network Connection Type
What do you want to do?
Connect to the Internet
Connect to the Internet so you can browse the Web and read email.
Connect to the network at my workplace
Connect to a business network (using dial-up or VPN) so you can work from home, a field office, or another location.
Set up a home or small office network
Connect to an existing home or small office network or set up a new one.
Set up an advanced connection
Connect directly to another computer using your serial, parallel, or infrared port, or set up this computer so that other computers can connect to it.
< Back
Next >
Cancel

- Select Connect to the Internet and click Next.
- On the Getting Ready screen select Set Up My Connection Manually and click Next.
- On the Internet Connection screen select Connect Using a Dial-Up Modem and click Next.
- Enter a Connection Name (any name you choose) and the dial-up Phone Number that will connect thru to the Console Server modem.

New Connection Wizard
Internet Account Information
You will need an account name and password to sign in to your Internet account.
Type an ISP account name and password, then write down this information and store it in a safe place. (If you have forgotten an existing account name or password, contact your ISP.)
User name:
Password:
Confirm password:
Use this account name and password when anyone connects to the Internet from this computer
Make this the default Internet connection
< Back
Next >
Cancel

- Enter the PPP User Name and Password for have set up for the Console Server.

5.1.4 Set Up Earlier Windows Clients for Dial-In

- For Windows 2000, the PPP client set up procedure is the same as above, except you get to the Dial-Up Networking Folder by clicking the Start button and selecting Settings. Then click Network and Dial-up Connections and click Make New Connection.
- Similarly, for Windows 98, you double-click My Computer on the Desktop, then open Dial-Up Networking and double click Make New Connection and proceed as above.

5.1.5 Set Up Linux Clients for Dial-In

The online tutorial http://www.yolinux.com/TUTORIALS/LinuxTutorialPPP.html presents a selection of methods for establishing a dial up PPP connection:

- Command line PPP and manual configuration (which works with any Linux distribution)
- Using the Linuxconf configuration tool (for Red Hat compatible distributions). This configures the scripts ifup/ifdown to start and stop a PPP connection
- Using the Gnome control panel configuration tool -
- WVDIAL and the Redhat "Dialup configuration tool"
- GUI dial program X-isp. Download/Installation/Configuration

Note For all PPP clients:

- Set the PPP link up with TCP/IP as the only protocol enabled
- Specify that the Server will assign IP address and do DNS
- Do not set up the Console Server PPP link as the default for Internet connection

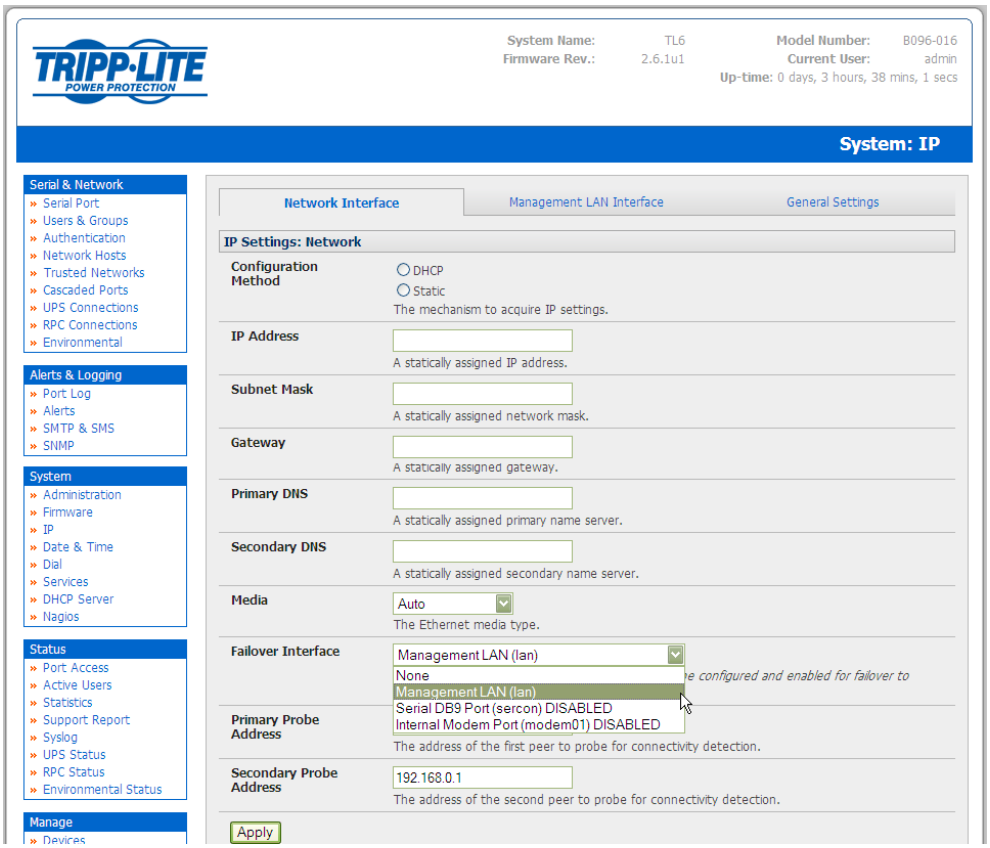
5.2 OoB Broadband Access (B096-048/016 only)

The B096-048/016 Console Server Management Switch has a second Ethernet network port that can be configured for alternate and OoB (out-of-band) broadband access. With two active broadband access paths to the Console Server, in the event you are unable to access through the primary management network, you may still have access through the alternate broadband path (e.g. a T1 link):

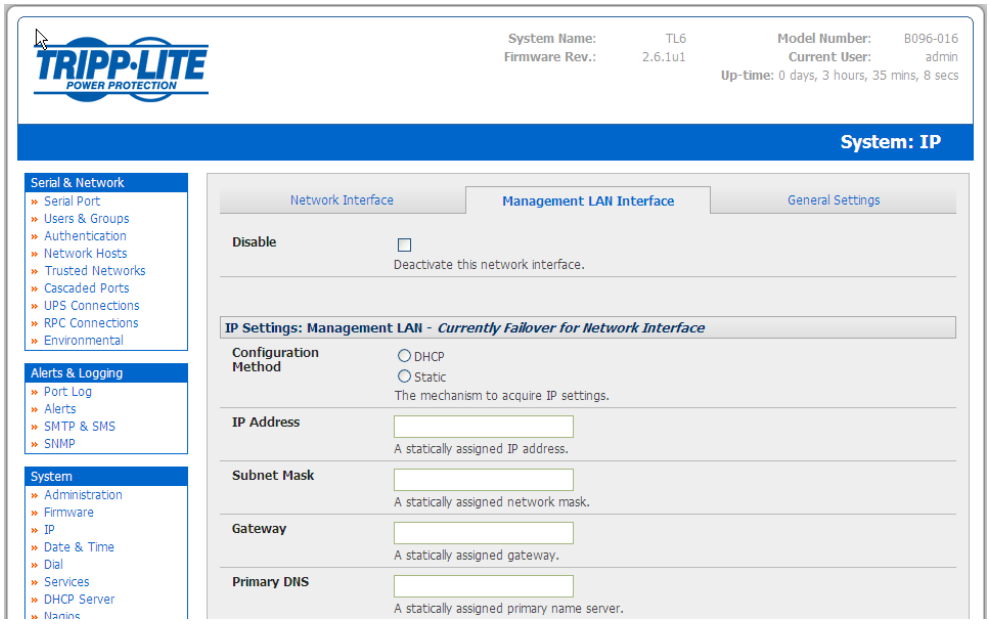
- On the System: IP menu, select Management LAN Interface and configure the IP Address, Subnet Mask, Gateway and DNS with the access settings that relate to the alternate link.
- Ensure that when configuring the principal Network Interface connection, you set the Failover Interface to None.

5.3 Broadband Ethernet Failover (B096-048/016 only)

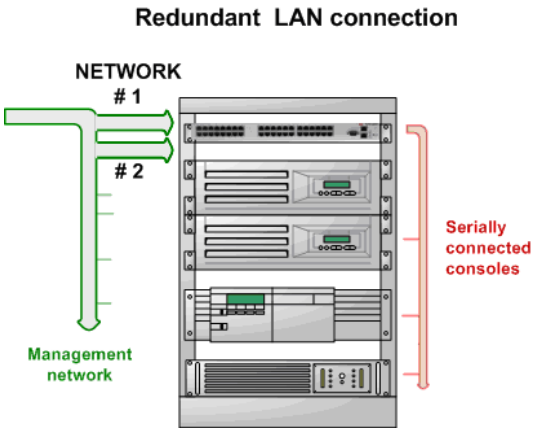
The second Ethernet port on the B096-048/016 Console Server Management Switch can also be configured for failover to ensure transparent high availability.



- When configuring the principal network connection on the System: IP Network Interface menu, select Management LAN (eth1) as the Failover Interface to be used when a fault has been detected with main Network Interface (eth0).
- Specify the Probe Addresses of two sites (the Primary and Secondary) that the B096-048/016 is to ping to determine if Network (eth0) is still operational.



- Then configure Management LAN Interface (eth1) with the same IP setting that you used for the main Network Interface (eth0) to ensure transparent redundancy.



In this mode, Network 2 (eth1) is available as the transparent back-up port to Network 1 (eth0) for accessing the management network. Network 2 will automatically and transparently take over the work of Network 1 if for any reason Network 1 becomes unavailable. And when Network 1 becomes available again, it takes over the work again.

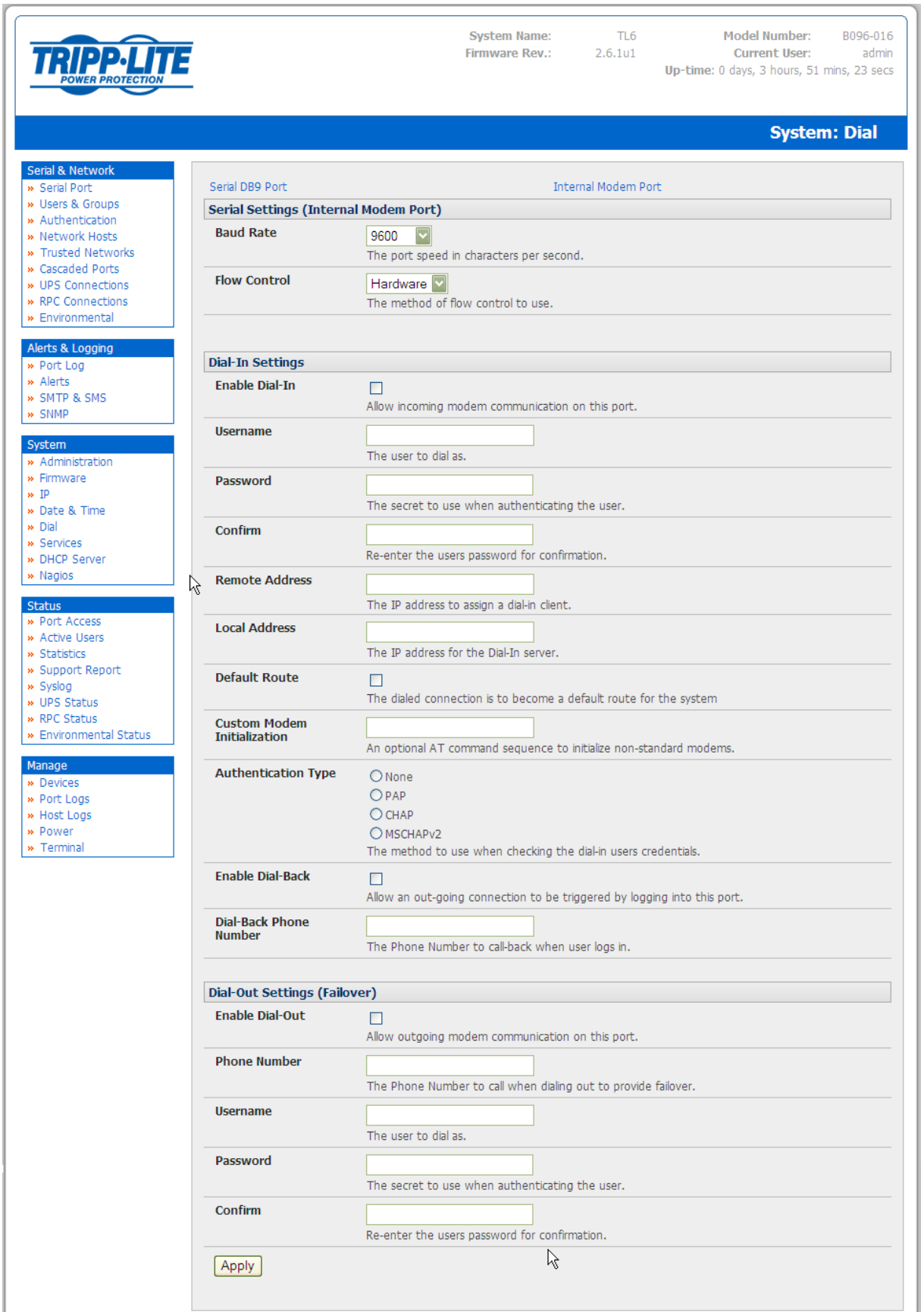
5.4 Dial-Out Failover

The Console Servers can be configured so a dial-out PPP connection is automatically set up in the event of a disruption in the principal management network:

- When configuring the principal network connection in System: IP, specify Internal Modem (or the Dial Serial DB9 if using an external modem on the Console port) as the Failover Interface to be used when a fault has been detected with Network1 (eth0).
- Specify the Probe Addresses of two sites (the Primary and Secondary) that the Console Server is to ping to determine if Network1 is still operational.
- Select the System: Dial menu option and the port to be configured (Serial DB9 Port or Internal Modem Port).
- Select the Baud Rate and Flow Control that will communicate with the modem.

Note You can further configure the console/modem port (*e.g.* to include *modem init* strings) by editing */etc/mgetty.config* files as described in Chapter 13.

- Check the Enable Dial-Out Access box and enter the access details for the remote PPP server to be called.

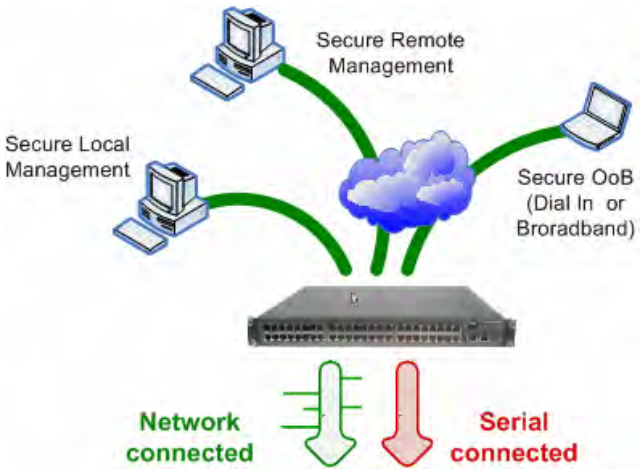

TRIPP·LITE
POWER PROTECTION
System Name: TL6
Firmware Rev.: 2.6.1u1
Model Number: B096-016
Current User: admin
Up-time: 0 days, 3 hours, 51 mins, 23 secs
System: Dial
Serial & Network
» Serial Port
» Users & Groups
» Authentication
» Network Hosts
» Trusted Networks
» Cascaded Ports
» UPS Connections
» RPC Connections
» Environmental
Alerts & Logging
» Port Log
» Alerts
» SMTP & SMS
» SNMP
System
» Administration
» Firmware
» IP
» Date & Time
» Dial
» Services
» DHCP Server
» Nagios
Status
» Port Access
» Active Users
» Statistics
» Support Report
» Syslog
» UPS Status
» RPC Status
» Environmental Status
Manage
» Devices
» Port Logs
» Host Logs
» Power
» Terminal
Serial DB9 Port
Internal Modem Port
Serial Settings (Internal Modem Port)
Baud Rate
9600
The port speed in characters per second.
Flow Control
Hardware
The method of flow control to use.
Dial-In Settings
Enable Dial-In
Allow incoming modem communication on this port.
Username
The user to dial as.
Password
The secret to use when authenticating the user.
Confirm
Re-enter the users password for confirmation.
Remote Address
The IP address to assign a dial-in client.
Local Address
The IP address for the Dial-In server.
Default Route
The dialed connection is to become a default route for the system
Custom Modem Initialization
An optional AT command sequence to initialize non-standard modems.
Authentication Type
None
PAP
CHAP
MSCHAPv2
The method to use when checking the dial-in users credentials.
Enable Dial-Back
Allow an out-going connection to be triggered by logging into this port.
Dial-Back Phone Number
The Phone Number to call-back when user logs in.
Dial-Out Settings (Failover)
Enable Dial-Out
Allow outgoing modem communication on this port.
Phone Number
The Phone Number to call when dialing out to provide failover.
Username
The user to dial as.
Password
The secret to use when authenticating the user.
Confirm
Re-enter the users password for confirmation.
Apply

6. SECURE TUNNELING AND SDT CONNECTOR

Introduction

Each Console Server has an embedded SSH server and uses SSH tunneling. This enables one Console Server to securely manage all the systems and network devices in the data center, using text-based console tools (such as SSH, Telnet, SoL) or graphical desktop tools (VNC, RDP, HTTPS, HTTP, X11, VMware, DRAC, iLO etc).

To set up Secure Tunnel access, the computer being accessed can be located on the same local network as the Console Server, or attached to the Console Server via its serial COM port. The remote User/Administrator then connects to the Console Server through an SSH tunnel (via dial-up, wireless or ISDN modem); a broadband Internet connection; an enterprise VPN network or a local network.



To set up the secure SSH tunnel from the Client computer to the Console Server, you must install and launch SSH client software on the User/Administrator's computer. It is recommended that you use the SDT Connector client software supplied with the Console Server to do this. SDT Connector is simple to install and it auto-configures. It provides all your users with point-and-click access to all the systems and devices in the secure network. With one click, SDT Connector sets up a secure SSH tunnel from the client to the selected Console Server and then establishes a port forward connection to the target network connected host or serial connected device. It will then execute the client application that will be used in communicating with the host.

This chapter details the basic SDT Connector operations:

- Configuring the Console Server for SSH tunneled access to network attached hosts and setting up permitted Services and Users access (Section 6.1)
- Setting up the SDT Connector client with gateway, host, service and client application details and making connections between the Client computer and hosts connected to the Console Server (Section 6.2)
- Using SDT Connector to browser access the Management Console (Section 6.3)

- Using SDT Connector to Telnet or SSH connect to devices that are serially attached to the Console Server (Section 6.4)

The chapter then covers more advanced SDT Connector and SDT tunneling topics:

- Using SDT Connector for out of band access (Section 6.5)
- Automatic importing and exporting of configurations (Section 6.6)
- Configuring Public Key Authentication (Section 6.7)
- Setting up a SDT Secure Tunnel for Remote Desktop (Section 6.8)
- Setting up a SDT Secure Tunnel for VNC (Section 6.9)
- Using SDT to IP connect to hosts that are serially attached to the Console Server (Section 6.10)

6.1 Configuring for SDT Tunneling to Hosts

To set up the Console Server to SDT access a network attached host, the host and the permitted services that are to be used in accessing that host need to be configured on the gateway, and User access privileges need to be specified:

- Add the new host and the permitted services using the Serial & Network: Network Hosts menu as detailed in Network Hosts (Chapter 4.4). Only these permitted services will be forwarded by SDT to the host. All other services (TCP/UDP ports) will be blocked.

Note Following are some of the TCP Ports used by SDT in the Console Server:

22	SSH (All SDT Tunneled connections)
23	Telnet on local LAN (forwarded inside tunnel)
80	HTTP on local LAN (forwarded inside tunnel)
3389	RDP on local LAN (forwarded inside tunnel)
5900	VNC on local LAN (forwarded inside tunnel)
73XX	RDP over serial from local LAN – where XX is the serial port number (i.e. 7301to 7348)
79XX	VNC over serial from local LAN – where XX is the serial port number

- Add the new Users using Serial & Network: Users & Groups menu as detailed in Network Hosts (Chapter 4.4). Users can be authorized to access the Console Server ports and specified network-attached hosts. To simplify configuration, the Administrator can first set up Groups with group access permissions, then Users can be classified as members of particular Groups.

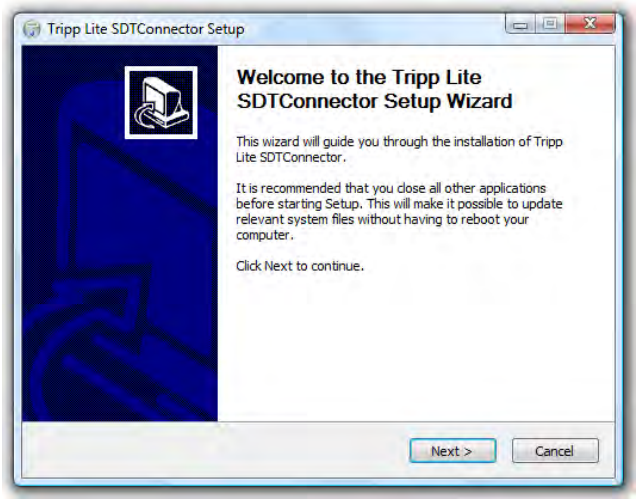
6.2 SDT Connector Configuration

The SDT Connector client works with all Console Servers. Each of these remote Console Servers has an embedded OpenSSH based server. This server can be configured to port forward connections from the SDT Connector client to hosts on their local network, as detailed in the previous chapter. The SDT Connector can also be pre-configured with the access tools and applications that will be available when access to a particular host has been established.

SDT Connector can connect to the Console Server using an alternate OoB access. It can also be configured to access the Console Server itself and to access devices connected to serial ports on the Console Server.

6.2.1 SDT Connector Client Installation

- The SDT Connector set up program (SDTConnector Setup-1.n.exe or sdtcon-1.n.tar.gz) is included on the CD supplied with your Console Server.
- Run the set-up program:


Tripp Lite SDTConnector Setup
Welcome to the Tripp Lite SDTConnector Setup Wizard
This wizard will guide you through the installation of Tripp Lite SDTConnector.
It is recommended that you close all other applications before starting Setup. This will make it possible to update relevant system files without having to reboot your computer.
Click Next to continue.
Next >
Cancel

Note For Windows clients, the *SDTConnectorSetup-1.n.exe* application will install the *SDT Connector 1.n.exe* and the config file *defaults.xml.* If a config file already exists on the Windows computer, then it will not be overwritten. To remove an earlier config file, run the *regedit* command, search for "SDT Connector" and then remove the directory with this name.

For Linux and other Unix clients, *SDTConnector.tar.gz* application will install the *sdtcon-1.n.jar* and the config file *defaults.xml*

Once the installer completes, you will have a working SDT Connector client installed on your machine and an icon on your desktop:

- Click the SDT Connector icon on your desktop to start the client.

Note *SDT Connector* is a Java application so it must have a Java Runtime Environment (JRE) installed. This can be freely downloaded from http://java.sun.com/j2se/ . It will install on Windows 2000, XP, 2003, Vista computers and on most Linux platforms. Solaris platforms are also supported however they must have Firefox installed. *SDT Connector* can run on any system with Java 1.4.2 and above installed, but it assumes the web browser is Firefox, and that *xterm -e Telnet* opens a Telnet window.

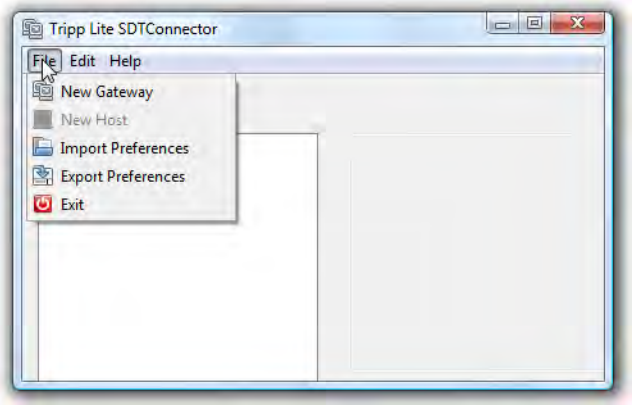
To operate SDT Connector, add the new gateways to the client software by entering the access details for each Console Server (refer to Section 6.2.2). Then let the client auto-configure with all host and serial port connections from each Console Server (refer Section 6.2.3). Now point-and-click to connect to the Hosts and serial devices (refer to Section 6.2.4).

Alternately you can manually add network connected hosts (refer Section 6.2.5) as well as manually configure new services to be used when accessing the Console Server and the hosts (refer Section 6.2.6). Manually configure clients to run on the computer that will use the service to connect to the hosts and serial port devices (refer to Section 6.2.7 and 6.2.9). SDT Connector can also be set up to make an out-of-band connection to the Console Server (refer to Section 6.2.9).

6.2.2 Configuring a New Gateway in the SDT Connector Client

To create a secure SSH tunnel to a new Console Server:

- Click the New Gateway icon or select the File: New Gateway menu option.



- Enter the IP or DNS Address of the Console Server and the SSH port that will be used (typically 22).

Note If *SDT Connector* is connecting to a remote Console Server through the public Internet or routed network, you will need to:

- Determine *the public IP address* of the Console Server (or of the router/ firewall that connects the Console Server to the Internet) as assigned by the ISP. One way to find the public IP address is to access http://checkip.dyndns.org/ or http://www.whatismyip.com/ from a computer on the same network as the Console Server and note the reported IP address
- Set port forwarding for TCP port 22 through any firewall/NAT/router that is located between *SDT Connector* and the Console Server so that it points to the Console Server. http://www.portforward.com has port forwarding instructions for a range of routers. Also you can use the Open Port Check tool from http://www.canyouseeme.org to check if port forwarding through local firewall/NAT/router devices has been properly configured

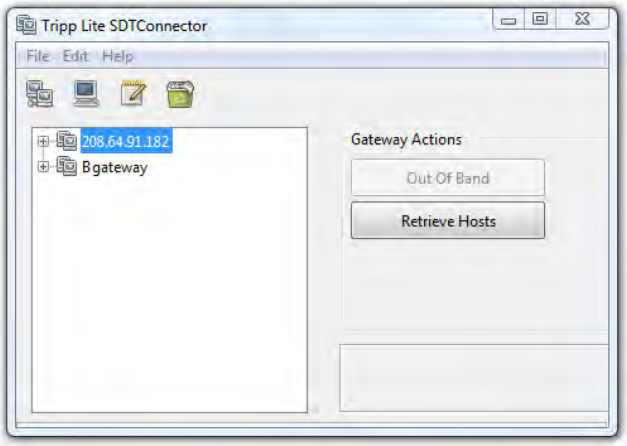
- Enter the Username and Password of a user on the gateway that has been enabled to connect via SSH and/or create SSH port redirections.

- Optionally, you can enter a Descriptive Name to display instead of the IP or DNS address, and any Notes or a Description of this gateway (such as its firmware version, site location or anything special about its network configuration).
- Click OK and an icon for the new gateway will now appear in the SDT Connector home page.

Note For an *SDT Connector* user to access a Console Server (and then access specific hosts or serial devices connected to that Console Server), that user must first be set up on the Console Server, and must be authorized to access the specific ports / hosts (refer to Chapter 5). Only these *permitted services* will be forwarded through by SDT to the Host. All other services (TCP/UDP ports) will be blocked.

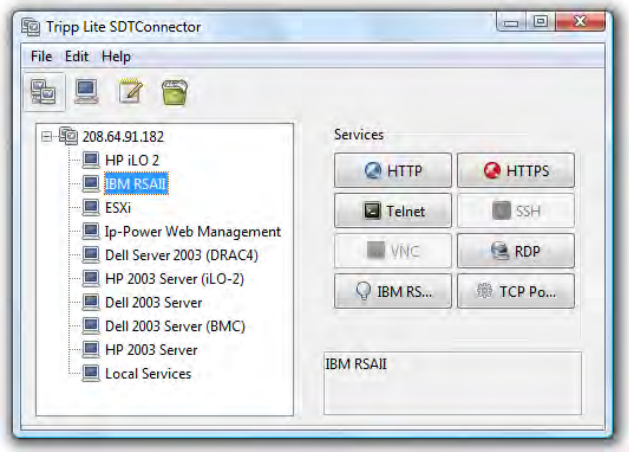
6.2.3 Auto-Configure SDT Connector Client with the User's Access Privileges

Each user on the Console Server has an access profile. This has been configured with the specific connected hosts and serial port devices the user has authority to access, and a specific set of the enabled services for each of them. This configuration can be auto-uploaded into the SDT Connector client:



- Click on the new gateway icon and select Retrieve Hosts. This will:

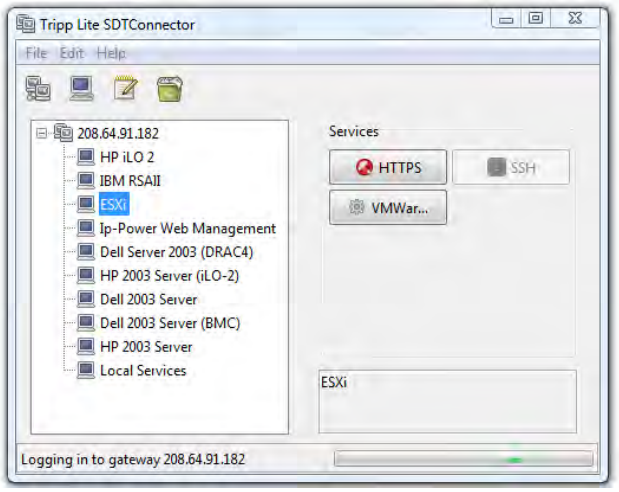
- Configure access to network-connected Hosts that the user is authorized to access and set up (for each of these Hosts) the services (e.g. HTTPS, IPMI2.0) and the related IP ports being redirected
- Configure access to the Console Server itself (this is shown as a Local Services host)
- Configure access with the enabled services for the serial port devices connected to the Console Server



Note The Retrieve Hosts function will auto-configure all classes of user (i.e. they can be members of *user* or *admin* or some other group or no group). SDT Connector will, however, not auto-configure the *root* (and it is recommended that this account is only used for initial config and for adding an initial *admin* account to the Console Server).

6.2.4 Make an SDT Connection Through the Gateway to a Host

- Simply point at the host to be accessed and click on the service to be used in accessing that host. The SSH tunnel to the gateway is then automatically established, the appropriate ports redirected through to the host, and the appropriate local client application is launched pointing at the local endpoint of the redirection:



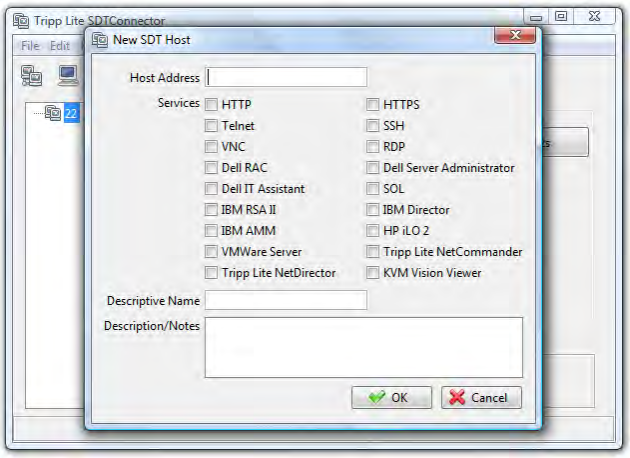
Note The SDT Connector client can be configured with an unlimited number of Gateways. Each Gateway can be configured to port forward to an unlimited number of locally networked Hosts. Similarly there is no limit on the number of SDT Connector clients who can be configured to access the one Gateway. There are also no limits on the number of Host connections that an SDT Connector client can concurrently have open through the one Gateway tunnel.

However, there is a limit on the number of SDT Connector SSH tunnels that can be open at one time on a particular Gateway. The B096-016 / B096-048 Console Server Management Switch and B092-016 Console Server with PowerAlert each support at least 50 such concurrent connections. So for a site with a B096-016 gateway you can have, at any time, up to 50 users securely controlling an unlimited number of network attached computers, power devices and other appliances (routers, etc) at that site.

6.2.5 Manually Adding Hosts to the SDT Connector Gateway

For each gateway, you can manually specify the network connected hosts that will be accessed through that Console Server; and for each host, specify the services that will used in communicating with the host:

- Select the newly added gateway and click the Host icon to create a host that will be accessible via this gateway. (Alternatively select File: New Host).

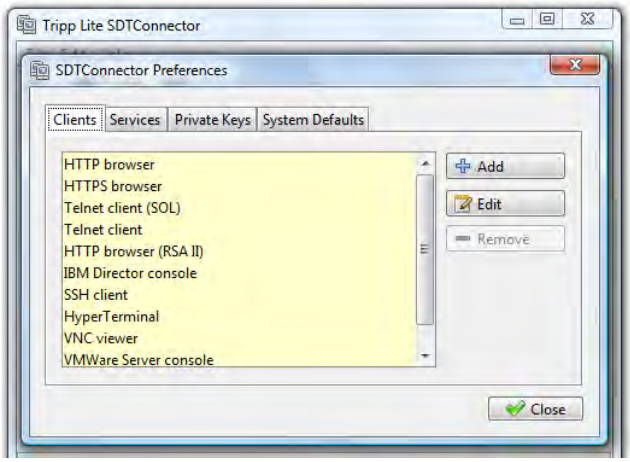


- Enter the IP or DNS Host Address of the host (if this is a DNS address, it must be resolvable by the gateway).
- Select which Services are to be used when accessing the new host. A range of service options are pre-configured in the default SDT Connector client (RDP, VNC, HTTP, HTTPS, Dell RAC, VMWare etc). However if you wish to add new services to the range then proceed to the next section (Adding a new service) then return here.
- Optionally, you can enter a Descriptive Name for the host to be displayed instead of the IP or DNS address, as well as any Notes or a Description of this host (such as its operating system/release, or anything special about its configuration).
- Click OK.

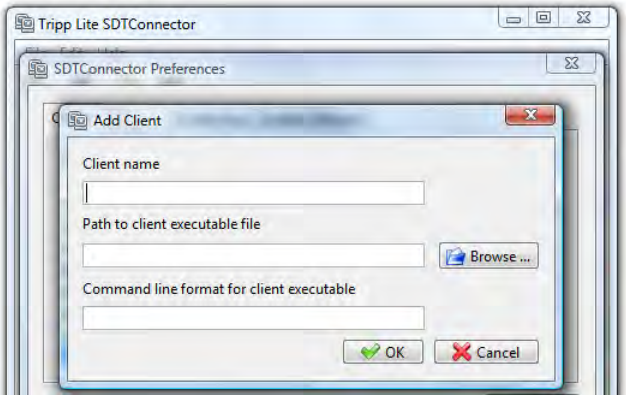
6.2.6 Manually Adding New Services to the New Hosts

To extend the range of services that can be used when accessing hosts with SDT Connector:

- Select Edit: Preferences and click the Services tab. Click Add.
- Enter a Service Name and click Add.
- Under the General tab, enter the TCP Port that this service runs on (e.g. 80 for HTTP). Optionally, select the client to be used to access the local endpoint of the redirection.



- Select which Client application is associated with the new service. A range of client application options are pre-configured in the default SDT Connector (RDP client, VNC client, HTTP browser, HTTPS browser, Telnet client etc). However if you wish to add new client applications to this range, then proceed to the next section (Adding a new client) and then return here.

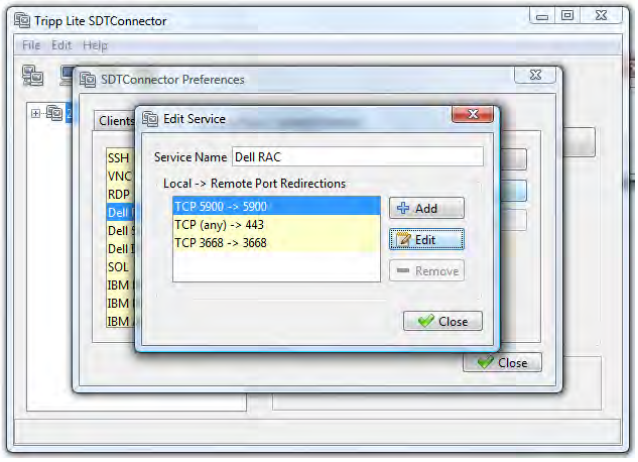


- Click OK, then Close.

A service typically consists of a single SSH port redirection and a local client to access it. However it may consist of several redirections; some or all of which may have clients associated with them.

An example is the Dell RAC service. The first redirection is for the HTTPS connection to the RAC server: it has a client associated with it (web browser) that is launched immediately upon clicking the button for this service.

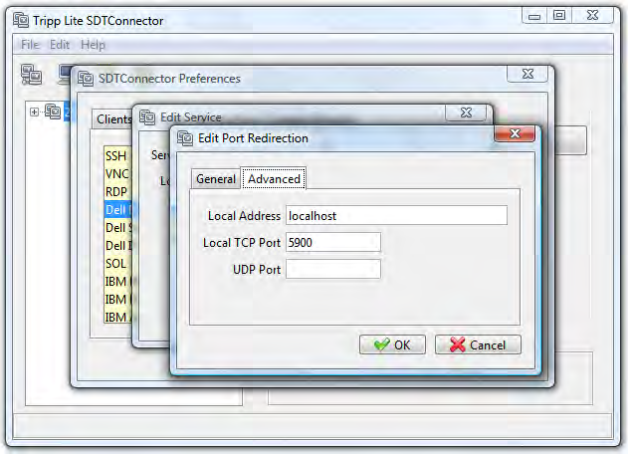
The second redirection is for the VNC service that the user may choose to launch later from the RAC web console. It automatically loads in a Java client served through the web browser, so it does not need a local client associated with it.



- On the Add Service screen, you can click Add as many times as needed to add multiple new port redirections and associated clients.

You may also specify Advanced port redirection options:

- Enter the local address to bind to when creating the local endpoint of the redirection. It is not usually necessary to change this from "localhost".
- Enter a local TCP port to bind to when creating the local endpoint of the redirection. If this is left blank, a random port will be selected.



Note *SDT Connector* can also tunnel UDP services. *SDT Connector* tunnels the UDP traffic through the TCP SSH redirection, so in effect it is a tunnel within a tunnel.

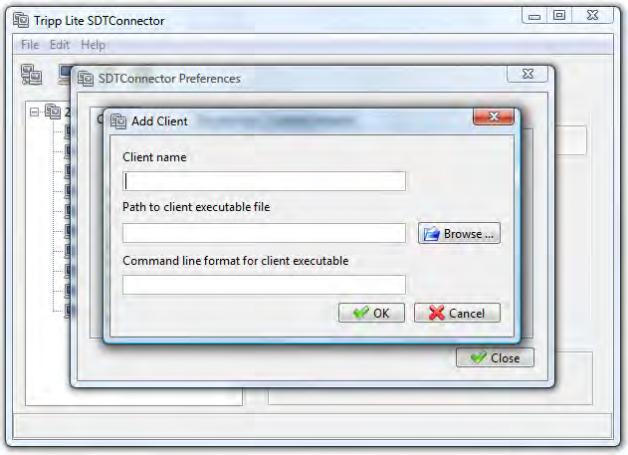
Enter the UDP port on which the service is running on the host. This will also be the local UDP port that *SDT Connector* binds as the local endpoint of the tunnel.

Note that for UDP services, you still need to specify a TCP port under General. This will be an arbitrary TCP port that is not in use on the gateway. An example of this is the SOL Proxy service. It redirects local UDP port 623 to remote UDP port 623 over the arbitrary TCP port 6667.

6.2.7 Adding a Client Program to be Started for the New Service

Clients are local applications that may be launched when a related service is clicked. To add to the pool of client programs:

- Select Edit: Preferences and click the Client tab. Click Add.



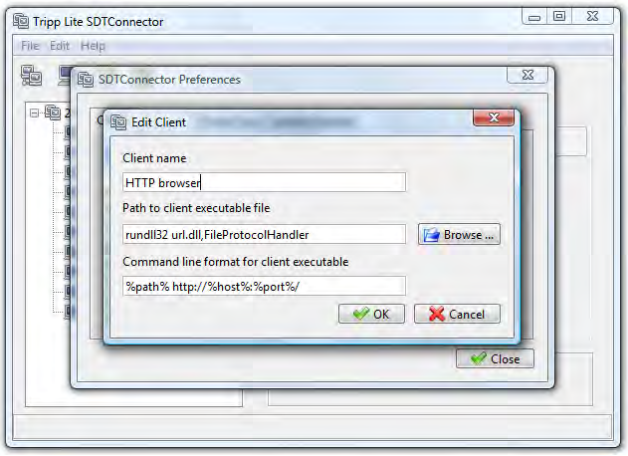
- Enter a Name for the client. Enter the Path to the executable file for the client (or click Browse to locate the executable).
- Enter a Command Line associated with launching the client application. SDT Connector typically launches a client using command line arguments to point it to the local endpoint of the redirection. There are three special keywords for specifying the command line format. When launching the client, SDT Connector substitutes these keywords with the appropriate values:

  %path% is path to the executable file, i.e. the previous field.

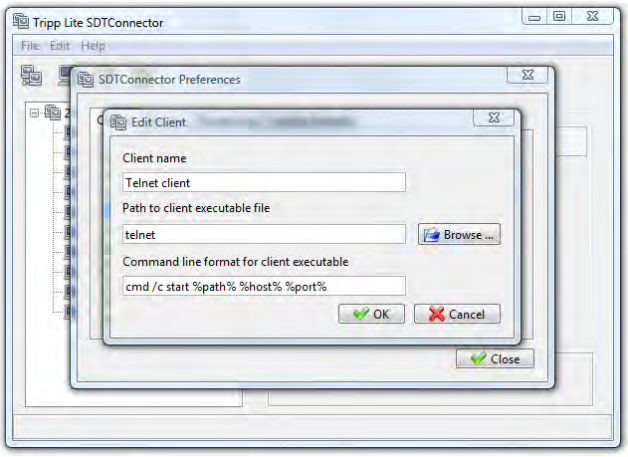
  %host% is the local address to which the local endpoint of the redirection is bound, i.e. the Local Address field for the Service redirection Advanced options.

  %port% is the local port to which the local endpoint of the redirection is bound, i.e. the Local TCP Port field for the Service redirection Advanced options. If this port is unspecified (i.e. "Any"), the appropriate randomly selected port will be substituted.

For example, SDT Connector is preconfigured for Windows installations with a HTTP service client that will connect with whichever local browser the local Windows user has configured as the default. Otherwise the default browser used is Firefox:



Also some clients are launched in a command line or terminal window. The Telnet client is an example of this:



- Click OK.

6.2.8 Dial-In Configuration

If the client computer is dialing into Local/Console port on the Console Server, you will need to set up a dial-in PPP link:

- Configure the Console Server for dial-in access (following the steps in the Configuring for Dial-In PPP Access section in Chapter 5, Configuring Dial In Access).
- Set up the PPP client software at the remote User computer (following the Set up the remote Client section in Chapter 5).

Once you have a dial-in PPP connection established, you can then set up the secure SSH tunnel from the remote Client computer to the Console Server.

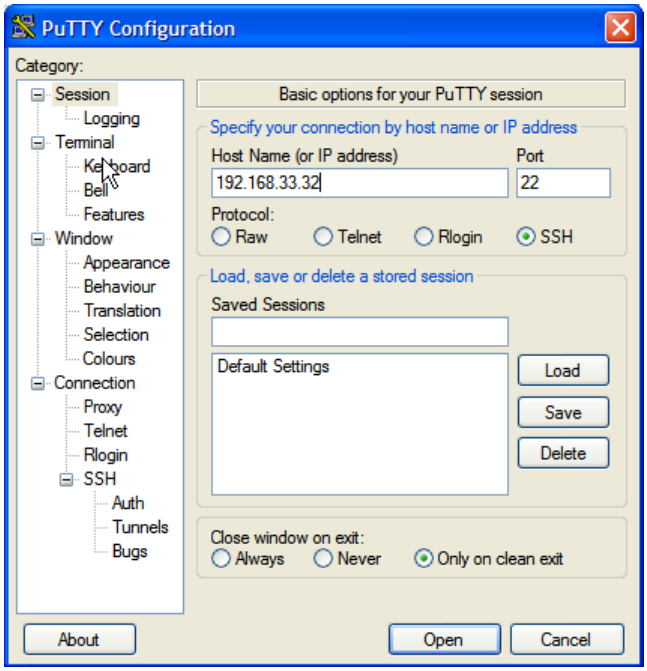
6.2.9 Choosing an Alternate SSH Client (e.g. PuTTY)

To set up the secure SSH tunnel from the Client computer to the Console Server, you must install and launch SSH client software on the Client computer. As described above it is recommended you use the

SDT Connector client software that is supplied with the gateway. However there is also a wide selection of commercial and free SSH client programs that are supported:

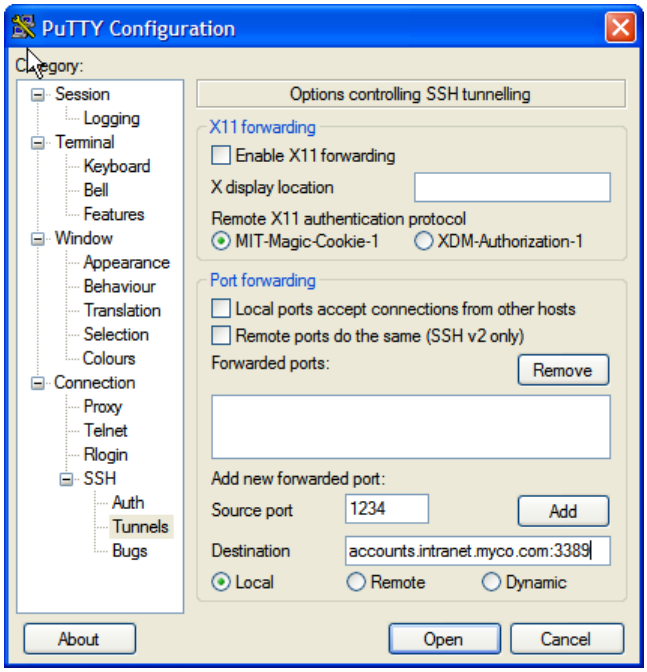
- PuTTY is a complete (though not very user-friendly:) freeware implementation of SSH for Win32 and UNIX platforms
- SSHTerm is a useful open source SSH communications package
- SSH Tectia is a leading end-to-end commercial communications security solution for the enterprise
- Reflection for Secure IT (formerly F-Secure SSH) is another good commercial SSH-based security solution

By way of example, the steps below show the establishment of an SSH connection and then forwarding the RDP port over this SSH connection, using the PuTTY client software:



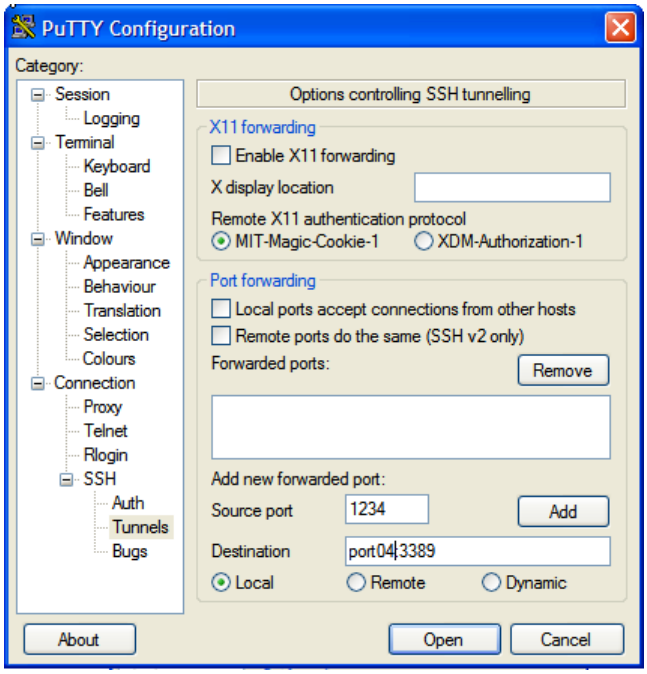
- Under the Session tab, enter the IP address of the Console Server in the Host Name or IP address field.
  - For dial-in connections, this IP address will be the Local Address that you assigned to the Console Server when you set it up as the Dial-In PPP Server
  - For Internet (or local/VPN connections) connections this will be the public IP address of the Console Server
- Select the SSH Protocol, and the Port will be set as 22.
- Under the SSH -> Tunnels tab, Add new forwarded port specifying the Source port as 1234 (or any number you choose).
- Set the Destination:
  - If your destination computer is network-connected to the Console Server, set the Destination as <SDT Host IP address/DNS Name>:3389. For example, if the SDT Host IP Address you

specified when setting up the SDT Hosts on the Console Server was accounts.myco.intranet.com, then specify the Destination as accounts.myco.intranet.com:3389



- If your destination computer is serially connected to the Console Server, set the Destination as <port label>:3389. For example, if the Label you specified on the SDT enabled serial port on the Console Server is win2k3, then specify the remote host as win2k3:3389. Alternately, you can set the Destination as portXX:3389 where XX is the SDT enabled serial port number. So for example, if port 4 is on the Console Server is to carry the RDP traffic then specify port04:3389

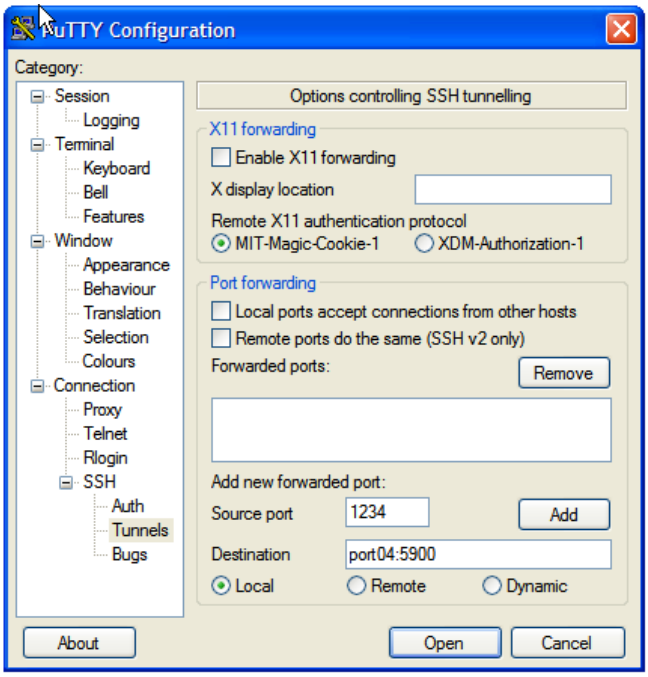
Note http://www.jfitz.com/tips/putty_config.html has examples on configuring PuTTY for SSH tunneling.



- Select Local and click the Add button.
- Click Open to SSH connect the Client computer to the Console Server. You will now be prompted for the Username/Password for the Console Server User you SDT enabled.

Note You can also secure the SDT communications from local and enterprise VPN-connected Client computers using SSH as above. This will protect against the risk of the "man in the middle" attacks to which RDP has a vulnerability.
http://www.securiteam.com/windowsntfocus/5EP010KG0G.html

To set up the secure SSH tunnel from the Client (Viewer) computer to the Console Server for VNC, follow the steps above. However, when configuring the VNC port redirection specify port 5900 (rather than port 3389 as was used for RDP) e.g. if using PuTTY:



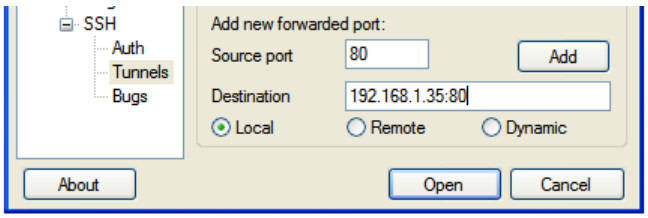
Note How secure is VNC? VNC access generally allows access to your whole computer, so security is very important. VNC uses a random challenge-response system to provide the basic authentication that allows you to connect to a VNC server. This is reasonably secure and the password is not sent over the network.

However, once connected, all subsequent VNC traffic is unencrypted. So a malicious user could snoop your VNC session. Also there are VNC scanning programs available, which will scan a subnet looking for computers which are listening on one of the ports which VNC uses.

Tunneling VNC over a SSH connection ensures all traffic is strongly encrypted. Also no VNC port is ever open to the internet, so anyone scanning for open VNC ports will not be able to find your computers. When tunneling VNC over a SSH connection, the only port which you're opening on your Console Server is the SDT port 22.

So sometimes it may be prudent to tunnel VNC through SSH even when the Viewer computer and the Console Server are both on the same local network.

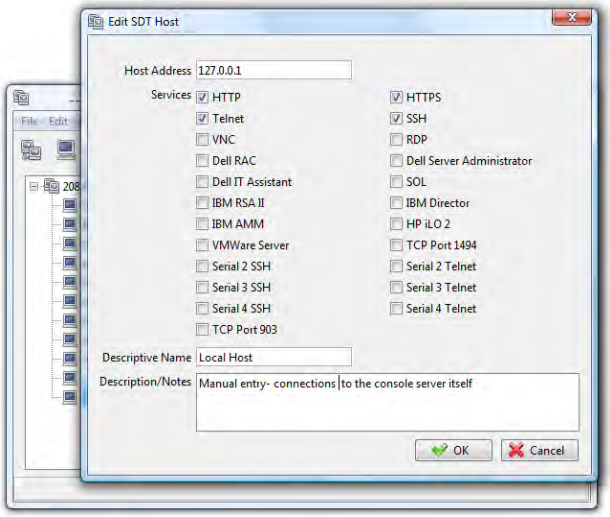
To set up the secure SSH tunnel for an HTTP browser connection from the client computer, follow the steps above. However when configuring the port redirection, specify port 80 (rather than port 3389 as was used for RDP) e.g. if using PuTTY:



6.3 SDT Connector to Management Console

SDT Connector can also be configured for browser access to the gateway's Management Console – and for Telnet or SSH access to the gateway command line. For these connections to the gateway itself, you must configure SDT Connector to access the gateway (itself) by setting the Console Server up as a host, and then configuring the appropriate services:

- Launch SDT Connector on your computer. Assuming you have already set up the Console Server as a Gateway in your SDT Connector client (with username/ password etc), select this newly added Gateway and click the Host icon to create a host. Alternatively, select File -> New Host.
- Enter 127.0.0.1 as the Host Address and give some details in Descriptive Name/Notes. Click OK.



- Click the HTTP or HTTPS Services icon to access the gateway's Management Console, and/or click SSH or Telnet to access the gateway command line console.

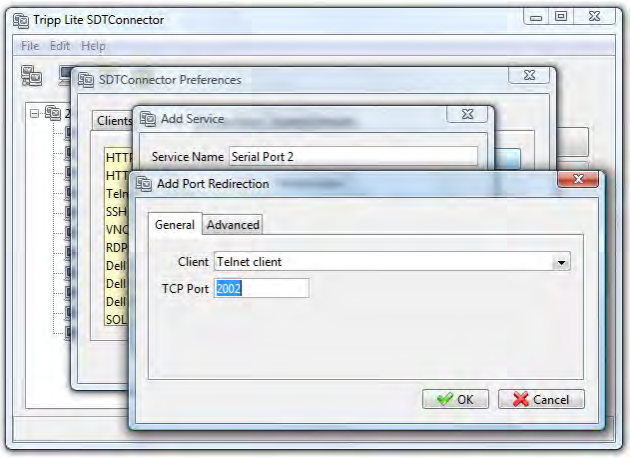
Note: To enable SDT access to the gateway console, you must now configure the Console Server to allow port forwarded network access to itself:

- Browse to the Console Server and select **Network Hosts** from **Serial & Network**. Click **Add Host** and in the **IP Address/DNS Name** field enter 127.0.0.1 (this is the Console Server's network loopback address). Then enter *Loopback* in **Description.**
- Remove all entries under **Permitted Services** except for those that will be used in accessing the Management Console (80/http or 443/https) or the command line (22/ssh or 23/Telnet). Scroll to the bottom and click **Apply.**
- Administrators by default have gateway access privileges. However for Users to access the gateway Management Console, you will need to give those Users the required access privileges. Select **Users & Groups** from **Serial & Network**. Click **Add User**. Enter a **Username**, **Description** and **Password/Confirm**. Select 127.0.0.1 from **Accessible Host**(s) and click **Apply.**

6.4 SDT Connector - Telnet or SSH Connect to Serially Attached Devices

SDT Connector can also be used to access text consoles on devices that are attached to the Console Server's serial ports. For these connections, you must configure the SDT Connector client software with a Service that will access the target gateway serial port, and then set the gateway up as a host:

- Launch SDT Connector on your computer. Select Edit -> Preferences and click the Services tab. Click Add.
- Enter "Serial Port 2" in Service Name and click Add.
- Select Telnet client as the Client. Enter 2002 in TCP Port. Click OK, then Close and Close again.



- Assuming you have already set up the target Console Server as a gateway in your SDT Connector client (with username/ password etc), select this gateway and click the Host icon to create a host. Alternatively, select File -> New Host.
- Enter 127.0.0.1 as the Host Address and select Serial Port 2 for Service. In Descriptive Name, enter something along the lines of Loopback ports, or Local serial ports. Click OK.
- Click Serial Port 2 icon for Telnet access to the serial console on the device attached to serial port #2 on the gateway.

To enable SDT Connector to access to devices connected to the gateway's serial ports, you must also configure the Console Server itself to allow port forwarded network access to itself, and enable access to the nominated serial port:

- Browse to the Console Server and select Serial Port from Serial & Network.
- Click Edit to selected Port # (e.g. Port 2 if the target device is attached to the second serial port). Ensure the port's serial configuration is appropriate for the attached device.
- Scroll down to Console Server Setting and select Console Server Mode. Check Telnet (or SSH) and scroll to the bottom and click Apply.
- Select Network Hosts from Serial & Network and click Add Host.
- In the IP Address/DNS Name field, enter 127.0.0.1 (this is the Console Server's network loopback address) and enter Loopback in Description.
- Remove all entries under Permitted Services and select TCP and enter 200n in Port. (This configures the Telnet port enabled in the previous step, so for Port 2 you would enter 2002.)

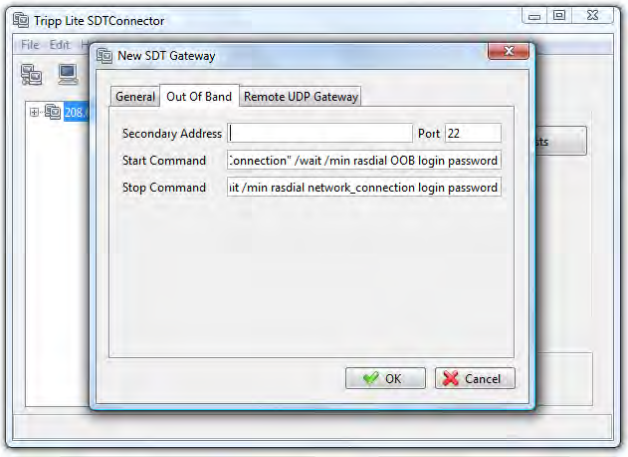
- Click Add then scroll to the bottom and click Apply.
- Administrators by default have gateway and serial port access privileges; however for Users to access the gateway and the serial port, you will need to give those Users the required access privileges. Select Users & Groups from Serial & Network. Click Add User. Enter a Username, Description and Password/Confirm. Select 127.0.0.1 from Accessible Host(s) and select Port 2 from Accessible Port(s). Click Apply.

6.5 Using SDT Connector for Out-of-Band Connection to the Gateway

SDT Connector can also be set up to connect to the Console Server (gateway) via out-of-band (OoB). OoB access uses an alternate path for connecting to the gateway (i.e. not the one used for regular data traffic). OoB access is useful when the primary link into the gateway is unavailable or unreliable.

Typically a gateway's primary link is a broadband Internet connection or Internet connection via a LAN or VPN, and the secondary out-of-band connectivity is provided by a dial-up or wireless modem directly attached to the gateway. So out-of-band access enables you to access the hosts and serial devices on the network, diagnose any connectivity issues, and restore the gateway's primary link.

In SDT Connector, OoB access is configured by providing the secondary IP address of the gateway, and telling SDT Connector how to start and stop the OoB connection. Starting an OoB connection may be achieved by initiating a dial-up connection, or adding an alternate route to the gateway. SDT Connector allows for maximum flexibility by allowing you to provide your own scripts or commands for starting and stopping the OoB connection.



To configure SDT Connector for OoB access:

- When adding a new gateway or editing an existing gateway, select the Out Of Band tab.
- Enter the secondary OoB IP address for the gateway (e.g. the IP address to be used when dialing in directly). You may also modify the gateway's SSH port if it's not using the default of 22.
- Enter the command or path to a script to start the OoB connection in Start Command.
  - To initiate a pre-configured dial-up connection under Windows, use the following Start Command:

cmd /c start "Starting Out of Band Connection" /wait /min rasdial network_connection login password

The network_connection in the above is the name of the network connection as displayed in Control Panel -> Network Connections. Login is the dial-in username, and password is the dial-in password for the connection.

- To initiate a pre-configured dial-up connection under Linux, use the following Start Command:

  pon network_connection

  The network_connection in the above is the name of the connection.

- Enter the command or path to a script to stop the OoB connection in Stop Command.
  - To stop a pre-configured dial-up connection under Windows, use the following Stop Command:

    cmd /c start "Stopping Out of Band Connection" /wait /min rasdial network_connection /disconnect

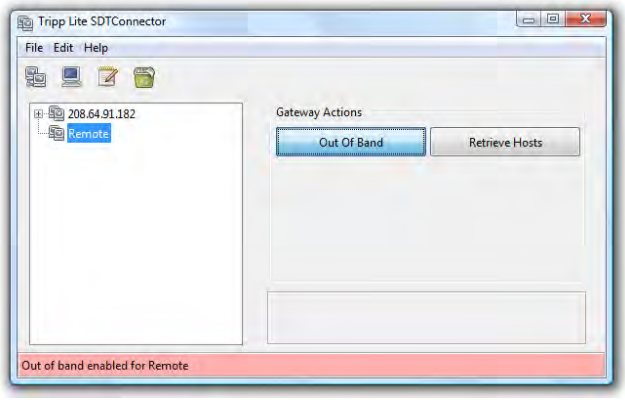
    The network_connection in the above is the name of the network connection as displayed in Control Panel -> Network Connections.

  - To stop a pre-configured dial-up connection under Linux, use the following Stop Command:

    poff network_connection

To make the OoB connection using SDT Connector:

- Select the gateway and click Out Of Band. The status bar will change color to indicate this gateway is now being access using the OoB link rather than the primary link.



When you connect to a service on a host behind the gateway, or to the Console Server gateway itself, SDT Connector will initiate the OoB connection using the provided Start Command. The OoB connection isn't stopped (using the provided Stop Command) until Out Of Band under Gateway Actions is clicked off, at which point the status bar will return to its normal color.

6.6 Importing (and exporting) Preferences

To enable the distribution of pre-configured client config files, SDT Connector has an Export/Import facility:

- To save a configuration .xml file (for backup or for importing into other SDT Connector clients), select File -> Export Preferences and select the location to save the configuration file.
- To import a configuration, select File -> Import Preferences and select the .xml configuration file to be installed.

6.7 SDT Connector Public Key Authentication

SDT Connector can authenticate against an SSH gateway using your SSH key pair rather than requiring your to enter your password. This is known as public key authentication.

To use public key authentication with SDT Connector, you must first add the public part of your SSH key pair to your SSH gateway:

- Ensure the SSH gateway allows public key authentication. This is typically the default behavior.
- If you do not already have a public/private key pair for your client computer (the one which the SDT Connector is running) generate them now using ssh-keygen, PuTTYgen or a similar tool. You may use RSA or DSA, however it is important that you leave the passphrase field blank:
  - PuTTYgen: http://www.chiark.greenend.org.uk/~sgtatham/putty/download.html
  - OpenSSH: http://www.openssh.org/
  - OpenSSH (Windows): http://sshwindows.sourceforge.net/download/
- Upload the public part of your SSH key pair (this file is typically named id_rsa.pub or id_dsa.pub) to the SSH gateway, or add it to the .ssh/authorized keys in your home directory on the SSH gateway.
- Next, add the private part of your SSH key pair (this file is typically named id_rsa or id_dsa) to SDT Connector. Click Edit -> Preferences -> Private Keys -> Add, locate the private key file and click OK.

You do not have to add the public part of your SSH key pair; it is calculated using the private key.

SDT Connector will now use public key authentication when connecting through the SSH gateway (Console Server). You may have to restart SDT Connector to shut down any existing tunnels that were established using password authentication.

If you have a host behind the Console Server that you connect to by clicking the SSH button in SDT Connector, you may also wish to configure access to it for public key authentication as well. This configuration is entirely independent of SDT Connector and the SSH gateway. You must configure the

SSH client that SDT Connector launches (e.g. Putty, OpenSSH) and the host's SSH server for public key authentication. Essentially, what you are using is SSH over SSH, and the two SSH connections are entirely separate.

6.8 Setting up SDT for Remote Desktop Access

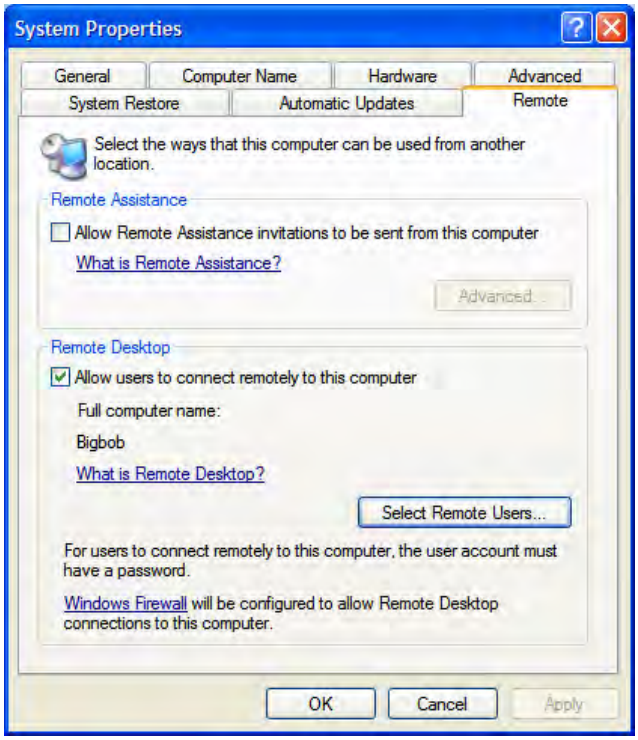
Microsoft's Remote Desktop Protocol (RDP) enables the system manager securely to access and manage remote Windows computers: to reconfigure applications and user profiles, upgrade the server's operating system, reboot the machine, etc. Secure Tunneling uses SSH tunneling, so this RDP traffic is securely transferred through an authenticated and encrypted tunnel.

SDT with RDP also allows remote Users to connect to Windows XP, Vista, Windows 2003 computers and to Windows 2000 Terminal Servers, and to have access to all of the applications, files, and network resources (with full graphical interface just as though they were in front of the computer screen itself). To set up a secure Remote Desktop connection, you must enable Remote Desktop on the target Windows computer that is to be accessed and configure the RPD client software on the client computer.

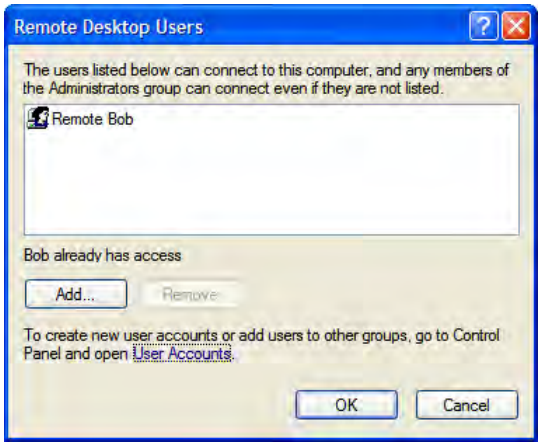
6.8.1 Enable Remote Desktop on the Target Windows Computer to be Accessed

To enable Remote Desktop on the Windows computer being accessed:

- Open System in the Control Panel and click the Remote tab.



- Check Allow users to connect remotely to this computer.
- Click Select Remote Users.


Remote Desktop Users
The users listed below can connect to this computer, and any members of the Administrators group can connect even if they are not listed.
Remote Bob
Bob already has access
Add...
Remove
To create new user accounts or add users to other groups, go to Control Panel and open User Accounts.
OK
Cancel

- To set the user(s) who can remotely access the system with RDP, click Add on the Remote Desktop Users dialog box.

Note If you need to set up new users for Remote Desktop access, open **User Accounts** in the Control Panel and proceed through the steps to nominate the new user's name, password and account type (Administrator or Limited).

Note With Windows XP Professional and Vista, you have only one Remote Desktop session and it connects directly to the Windows root console. With Windows Server 2008 you can have multiple sessions, and with Server 2003 you have three sessions (the console session and two other general sessions). Therefore, more than one user can have an active session on a single computer.

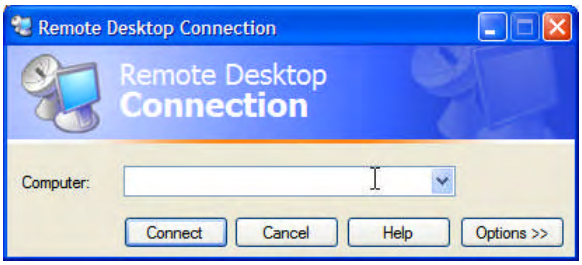
When the remote user connects to the accessed computer on the console session, Remote Desktop automatically locks that computer (so no other user can access the applications and files). When you come back to the computer, you can unlock it by typing CTRL+ALT+DEL

6.8.2 Configure the Remote Desktop Connection Client

Now that you have the Client computer securely connected to the Console Server (either locally, or remotely, thru the enterprise VPN, or a secure SSH internet tunnel or a dial-in SSH tunnel), you are ready to establish the Remote Desktop connection from the Client. To do this you simply enable the Remote Desktop Connection on the remote client computer then point it to the SDT Secure Tunnel port in the Console Server:

A. On a Windows client computer:

- Click Start. Point to Programs, then to Accessories, then Communications, and click Remote Desktop Connection.



- In Computer, enter the appropriate IP Address and Port Number:
  - Where there is a direct local or enterprise VPN connection, enter the IP Address of the Console Server, and the Port Number of the SDT Secure Tunnel for the Console Server's serial port (the one that is attached to the Windows computer to be controlled). For example, if the Windows computer is connected to serial Port 3 on a Console Server located at 192.168.0.50 then you would enter 192.168.0.50:7303
  - Where there is an SSH tunnel (over a dial-up PPP connection or over a public internet connection or private network connection), simply enter the localhost as the IP address, i.e. 127.0.0.1. For Port Number, enter the source port you created when setting SSH tunneling/port forwarding (in Section 6.1.6) e.g. :1234
- Click Option. In the Display section, specify an appropriate color depth (e.g. for a modem connection it is recommended you not use over 256 colors). In Local Resources, specify the peripherals on the remote Windows computer that are to be controlled (printer, serial port, etc.).

- Click Connect.

Note The Remote Desktop Connection software is pre-installed on Windows XP. However, for earlier Windows computers, you will need to download the RDP client:

- Go to the Microsoft Download Center site http://www.microsoft.com/downloads/details.aspx?familyid=80111F21-D48D-426E-96C2-08AA2BD23A49&displaylang=en and click the **Download** button

This software package will install the client portion of Remote Desktop on Windows 95, Windows 98 and 98 Second Edition, Windows Me, Windows NT 4.0, Windows 2000, and Windows 2003. When run, this software allows these older Windows platforms to remotely connect to a computer running Windows XP Professional or Windows 2003 Server.

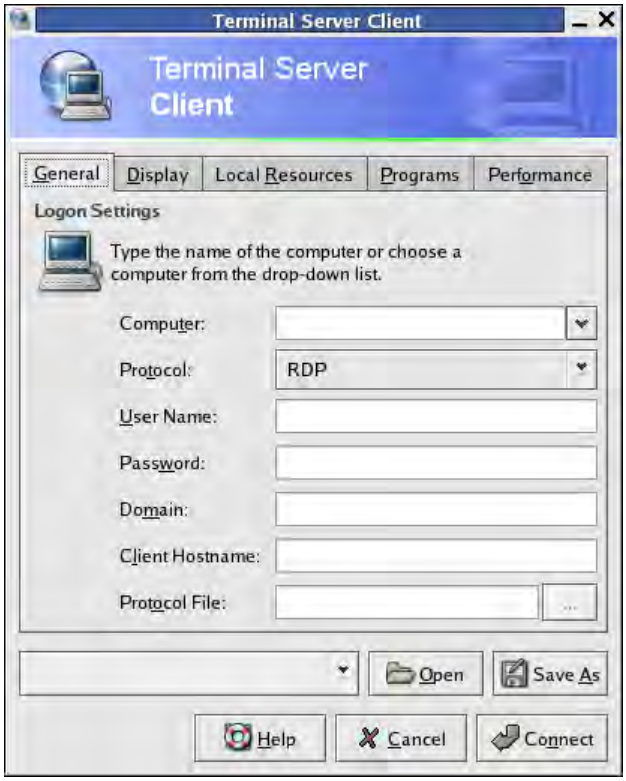
B. On a Linux or UNIX client computer:

- Launch the open source rdesktop client:

  rdesktop -u windows-user-id -p windows-password -g 1200x950 ms-windows-terminal-server-host-name

option	description
-a	Color depth: 8, 16, 24
-r	Device redirection. i.e. Redirect sound on remote machine to local device i.e. -0 -r sound (MS/Windows 2003)
-g	Geometry: widthxheight or 70% screen percentage
-p	Use -p - to receive password prompt

- You can use GUI front end tools like the GNOME Terminal Services Client tsclient to configure and launch the rdesktop client. (Using tsclient also enables you to store multiple configurations of rdesktop for connection to many servers.)



Note The *rdesktop* client is supplied with Red Hat 9.0:

- rpm -ivh rdesktop-1.2.0-1.i386.rpm

For Red Hat 8.0 or other distributions of Linux; download source, untar, configure, make, make then install.

rdesktop currently runs on most UNIX based platforms with the X Window System and can be downloaded from http://www.rdesktop.org/

C. On a Macintosh client:

- Download Microsoft's free Remote Desktop Connection client for Mac OS X: http://www.microsoft.com/mac/otherproducts/otherproducts.aspx?pid=remotedesktopclient

6.9 SDT SHH Tunnel for VNC

Alternately, with SDT and Virtual Network Computing (VNC), Users and Administrators can securely access and control Windows 98/NT/2000/XP/2003, Linux, Macintosh, Solaris and UNIX computers. There's a range of popular VNC software available (UltraVNC, RealVNC, TightVNC) freely and commercially. To set up a secure VNC connection, install and configure the VNC Server software on the computer to be accessed. Then install and configure the VNC Viewer software on the Viewer computer.

6.9.1 Install and Configure the VNC Server on the Computer to be Accessed

Virtual Network Computing (VNC) software enables users to remotely access computers running Linux, Macintosh, Solaris, UNIX, all versions of Windows and most other operating systems.

A. For Microsoft Windows servers (and clients):

Windows does not include VNC software, so you will need to download, install and activate a third party VNC Server software package:

RealVNC http://www.realvnc.com is fully cross-platform, so a desktop running on a Linux machine may be displayed on a Windows computer, on a Solaris machine, or on any number of other architectures. There is a Windows server, allowing you to view the desktop of a remote Windows machine on any of these platforms using exactly the same viewer. RealVNC was founded by members of the AT&T team who originally developed VNC.

TightVNC http://www.tightvnc.com is an enhanced version of VNC. It has added features such as file transfer, performance improvements and read-only password support. They have just recently included a video drive much like UltraVNC. TightVNC is still free, cross-platform (Windows Unix and Linux) and compatible with the standard (Real) VNC.

UltraVNC http://ultravnc.com is easy to use, fast and free VNC software that has pioneered and perfected features that the other flavors have consistently refused or been very slow to implement for cross platform and minimalist reasons. UltraVNC runs under Windows operating systems (95, 98, Me, NT4, 2000, XP, 2003) Download UltraVNC from Sourceforge's UltraVNC file list

B. For Linux servers (and clients):

Most Linux distributions now include VNC Servers and Viewers. They are generally launched from the (Gnome/KDE etc) front end. For example, there's VNC Server software with Red Hat Enterprise Linux 4 and a choice of Viewer client software. To launch:

- Select the Remote Desktop entry in the Main Menu -> Preferences menu.
- Click the Allow other users checkbox to allow remote users to view and control your desktop.

Remote Desktop Preferences
Sharing
Allow other users to view your desktop
Allow other users to control your desktop
Users can view your desktop using this command:
vncviewer hoopoe.elk:0
Security
When a user tries to view or control your desktop:
Ask you for confirmation
Require the user to enter this password:
Password:
Close

- To set up a persistent VNC server on Red Hat Enterprise Linux 4:
  - Set a password using vncpasswd
  - Edit /etc/sysconfig/vncservers
  - Enable the service with chkconfig vncserver on
  - Start the service with service vncserver start
  - Edit /home/username/.vnc/xstartup if you want a more advanced session than just twm and an xterm

C. For Macintosh servers (and clients):

OSXvnc http://www.redstonesoftware.com/vnc.html is a robust, full-featured VNC server for Mac OS X that allows any VNC client to remotely view and/or control Mac OS X machine. OSXvnc is supported by Redstone Software.

D. Most other operating systems (Solaris, HPUX, PalmOS etc) either come with VNC bundled, or have third-party VNC software that you can download.

6.9.2 Install, Configure and Connect the VNC Viewer

VNC is truly platform-independent, so a VNC Viewer on any operating system can connect to a VNC Server on any other operating system. There are Viewers (and Servers) from a wide selection of sources (e.g. UltraVNC TightVNC or RealVNC) for most operating systems. There are also a wealth of Java viewers available so that any desktop can be viewed with any Java-capable browser (http://en.wikipedia.org/wiki/VNC lists many of the VNC Viewers sources).

- Install the VNC Viewer software and set it up for the appropriate speed connection.

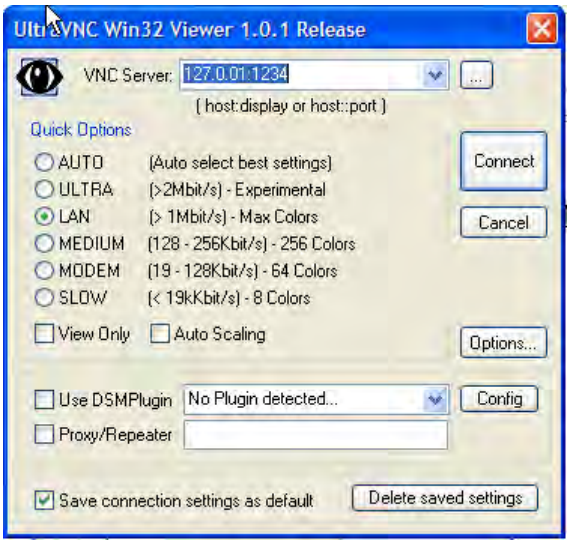
Note To make VNC faster, when you set up the Viewer:

- Set encoding to ZRLE (if you have a fast enough CPU)
- Decrease color level (e.g. 64 bit)
- Disable the background transmission on the Server or use a plain wallpaper

(Refer to http://doc.uvnc.com for detailed configuration instructions.)

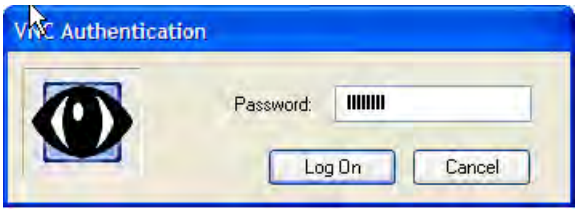
- To establish the VNC connection, first configure the VNC Viewer, entering the VNC Server IP address.

A. When the Viewer computer is connected to the Console Server through an SSH tunnel (over the public Internet, or a dial-in connection, or private network connection), enter localhost (or 127.0.0.1) as the IP VNC Server IP address and the source port you entered when setting SSH tunneling/port forwarding (in Section 6.2.6) e.g. :1234



B. When the Viewer computer is connected directly to the Console Server (either locally or remotely through a VPN or dial-in connection) and the VNC Host computer is serially connected to the Console Server, then enter the IP address of the Console Server unit with the TCP port that the SDT tunnel will use. The TCP port will be 7900 plus the physical serial port number (i.e. 7901 to 7948, so all traffic directed to port 79xx on the Console Server is tunneled through to port 5900 on the PPP connection on serial Port xx). For example, for a Windows Viewer computer using UltraVNC connecting to a VNC Server which is attached to Port 1 on a Console Server, enter 192.168.0.1

- You can then establish the VNC connection by simply activating the VNC Viewer software on the Viewer computer and entering the password.



Note For general background reading on Remote Desktop and VNC access, we recommend the following:

- *The Microsoft Remote Desktop How-To* http://www.microsoft.com/windowsxp/using/mobility/getstarted/remoteintro.mspx
- *The Illustrated Network Remote Desktop* help page http://theillustratednetwork.mvps.org/RemoteDesktop/RemoteDesktopSetupandTroubleshooting.html
- *What is Remote Desktop in Windows XP and Windows Server 2003?* by Daniel Petri http://www.petri.co.il/what's_remote_desktop.htm
- *Frequently Asked Questions about Remote Desktop* http://www.microsoft.com/windowsxp/using/mobility/rdfaq.mspx
- *Secure remote access of a home network using SSH, Remote Desktop and VNC for the home user* http://theillustratednetwork.mvps.org/RemoteDesktop/SSH-RDP-VNC/RemoteDesktopVNCandSSH.html
- *Taking your desktop virtual with VNC,* Red Hat magazine http://www.redhat.com/magazine/006apr05/features/vnc/ and http://www.redhat.com/magazine/007may05/features/vnc/
- *Wikipedia* general background on VNC http://en.wikipedia.org/wiki/VNC

6.10 Using SDT to IP Connect to Hosts that are Serially Attached to the Gateway

Network (IP) protocols like RDP, VNC and HTTP can also be used to connect to host devices that are serially connected through their COM port to the Console Server. To do this you must:

- establish a PPP connection (Section 6.7.1) between the host and the gateway, then
- set up Secure Tunneling - Ports on the Console Server (Section 6.7.2), then
- configure SDT Connector to use the appropriate network protocol to access IP consoles on the host devices that are attached to the Console Server serial ports (Section 6.7.3)

6.10.1 Establish a PPP Connection Between the Host COM Port and Console Server

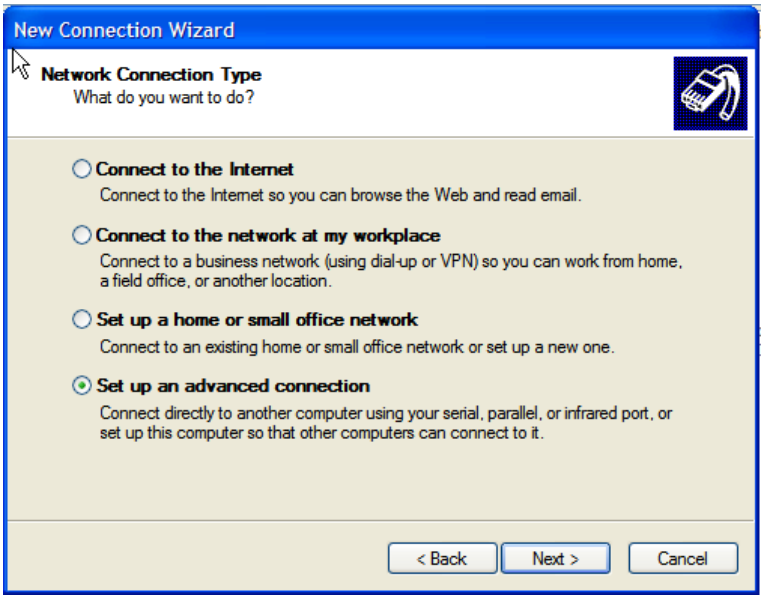
(This step is only necessary for serially connected computers)

Firstly, physically connect the COM port on the host computer that is to be accessed to the serial port on the Console Server. Then:

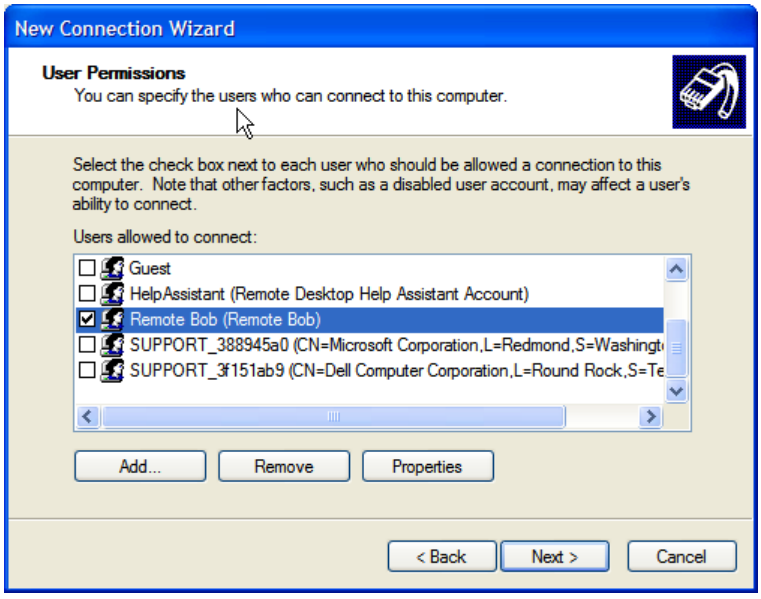
A. For non-Windows computers (Linux, UNIX, Solaris etc), establish a PPP connection over the serial port. The online tutorial http://www.yolinux.com/TUTORIALS/LinuxTutorialPPP.html presents a selection of methods for establishing a PPP connection for Linux.

B. For Windows XP and 2003 computers, follow the steps below to set up an advanced network connection between the Windows computer, through its COM port, to the Console Server. Both Windows 2003 and Windows XP Professional allow you to create a simple dial-in service which can be used for the Remote Desktop/VNC/HTTP/X connection to the Console Server:

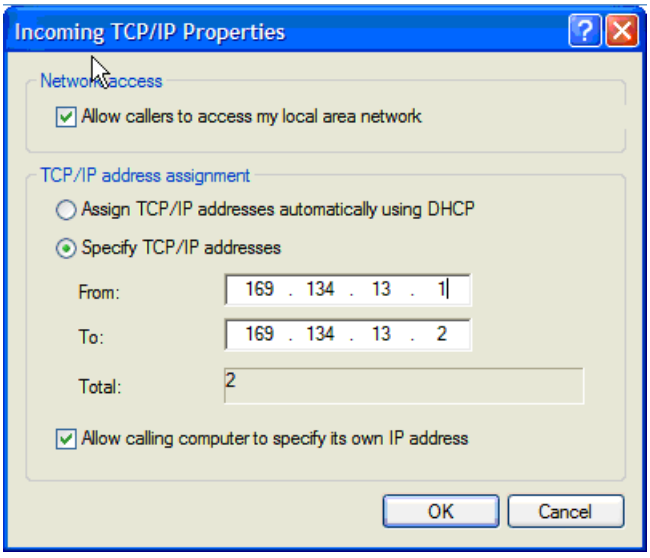
- Open Network Connections in Control Panel and click the New Connection Wizard.


New Connection Wizard
Network Connection Type
What do you want to do?
Connect to the Internet
Connect to the Internet so you can browse the Web and read email.
Connect to the network at my workplace
Connect to a business network (using dial-up or VPN) so you can work from home, a field office, or another location.
Set up a home or small office network
Connect to an existing home or small office network or set up a new one.
Set up an advanced connection
Connect directly to another computer using your serial, parallel, or infrared port, or set up this computer so that other computers can connect to it.
< Back
Next >
Cancel

- Select Set up an advanced connection and click Next.
- On the Advanced Connection Options screen, select Accept Incoming Connections and click Next.
- Select the Connection Device (i.e. the serial COM port on the Windows computer that you cabled through to the Console Server). By default, select COM1. The COM port on the Windows computer should be configured to its maximum baud rate. Click Next.
- On the Incoming VPN Connection Options screen, select Do not allow virtual private connections and click Next.


New Connection Wizard
User Permissions
You can specify the users who can connect to this computer.
Select the check box next to each user who should be allowed a connection to this computer. Note that other factors, such as a disabled user account, may affect a user's ability to connect.
Users allowed to connect:
Guest
HelpAssistant (Remote Desktop Help Assistant Account)
Remote Bob (Remote Bob)
SUPPORT_388945a0 (CN=Microsoft Corporation,L=Redmond,S=Washingt
SUPPORT_3f151ab9 (CN=Dell Computer Corporation,L=Round Rock,S=Te
Add...
Remove
Properties
< Back
Next >
Cancel

- Specify which Users will be allowed to use this connection. This should be the same Users who were given Remote Desktop access privileges in the earlier step. Click Next.
- On the Network Connection screen, select TCP/IP and click Properties.


Incoming TCP/IP Properties
Network access
Allow callers to access my local area network
TCP/IP address assignment
Assign TCP/IP addresses automatically using DHCP
Specify TCP/IP addresses
From: 169 . 134 . 13 . 1
To: 169 . 134 . 13 . 2
Total: 2
Allow calling computer to specify its own IP address
OK
Cancel

- Select Specify TCP/IP addresses on the Incoming TCP/IP Properties screen. Nominate a From: and a To: TCP/IP address and click Next.

Note You can choose any TCP/IP addresses as long as they are addresses which are not used anywhere else on your network. The *From:* address will be assigned to the Windows XP/2003 computer and the *To:* address will be used by the Console Server. For simplicity, use the IP address as shown in the illustration above:

From: 169.134.13.1

To: 169.134.13.2

Alternately you can set the advanced connection and access on the Windows computer to use the Console Server defaults:

- Specify 10.233.111.254 as the *From:* address
- Select *Allow calling computer to specify its own address*

Also you could use the Console Server default username and password when you set up the new Remote Desktop User and give this User permission to use the advance connection to access the Windows computer:

- The Console Server default *Username is portXX* where XX is the serial port number on the Console Server
- The default *Password is portXX*

So to use the defaults for an RDP connection to the serial port 2 on the Console Server, you would have set up a Windows user named *port02.*

➢ When the PPP connection has been set up, a network icon will appear in the Windows task bar.

Note The above notes describe setting up an incoming connection for Windows XP. The steps are the same for Windows 2003, except that the setup screens present slightly differently:

Put a check in the box for *Always allow directly connected devices such as palmtop…..*

Also, the option to **Set up an advanced connection** is not available in Windows 2003 if RRAS is configured. If RRAS has been configured, it is a simple task to enable the null modem connection for the dial-in configuration.

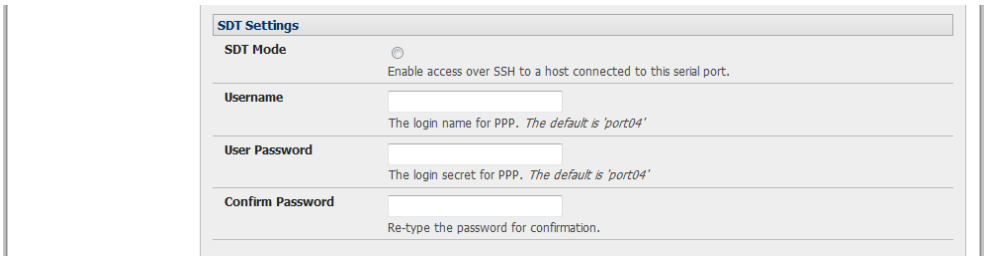
C. For earlier version Windows computers, follow the steps in Section B, above. To get to the Make New Connection button:

- For Windows 2000, click Start and select Settings. At the Dial-Up Networking Folder, click Network and Dial-up Connections and click Make New Connection. Note: you first may need to set up a connection over the COM port using Connect directly to another computer before proceeding to Set up an advanced connection
- For Windows 98, you double-click My Computer on the Desktop, then open Dial-Up Networking and double-click

6.10.2 Set Up SDT Serial Ports on Console Server

To set up RDP (and VNC) forwarding on the Console Server's Serial Port that is connected to the Windows computer COM port:

- Select the Serial & Network: Serial Port menu option and click Edit (for the particular Serial Port that is connected to the Windows computer COM port).
- On the SDT Settings menu, select SDT Mode (which will enable port forwarding and SSH tunneling) and enter a Username and User Password.


SDT Settings
SDT Mode
Enable access over SSH to a host connected to this serial port.
Username
The login name for PPP. The default is 'port04'
User Password
The login secret for PPP. The default is 'port04'
Confirm Password
Re-type the password for confirmation.

Note When you enable SDT, this will override all other Configuration protocols on that port.

Note If you leave the *Username* and *User Password* fields blank, they default to *portXX* and *portXX* where XX is the serial port number. So the default username and password for Secure RDP over Port 2 is *port02*

- Ensure the Console Server Common Settings (Baud Rate, Flow Control) are the same as were set up on the Windows computer COM port and click Apply.
- RDP and VNC forwarding over serial ports is enabled on a Port basis. You can add Users who can have access to these ports (or reconfigure User profiles) by selecting Serial & Network :User & Groups menu tag - as described earlier in Chapter 4 Configuring Serial Ports.

6.10.3 Set Up SDT Connector to SSH Port Forward Over the Console Server Serial Port

In the SDT Connector software running on your remote computer, specify the gateway IP address of your Console Server and a username/password for a user you have setup on the Console Server that has access to the desired port.

Next, add a New SDT Host. In the Host address you need to put portxx where xx = the port to which you are connecting. Example, for port 3 you would have a Host Address of: port03 and then select the RDP Service check box.

7. ALERTS AND LOGGING

Introduction

This chapter describes the alert generation and logging features of the Console Server. The alert facility monitors the serial ports, all logins, the power status and environmental monitors and probes. It sends emails, SMS, Nagios or SNMP alerts when specified trigger events occurs.

- First, enable and configure the service that will be used to carry the alert (Section 7.1)
- Then specify the alert trigger condition and the actual destination to which that particular alert is to be sent (Section 7.2)

The Console Servers can also be configured selectively to maintain log records of all access and communications with the Console Server and with the attached serial devices, all system activity and a history of the status of any attached environmental monitors, UPS and PDU devices. The Console Servers can also log access and communications with network attached hosts.

- If port logs are to be maintained on a remote server, then the access path to this location needs to be configured (Section 7.3)
- Then you need to activate and set the desired levels of logging for each serial (Section 7.4) and/or network port (Section 7.5) and/or power and environment devices (refer to Chapter 8)

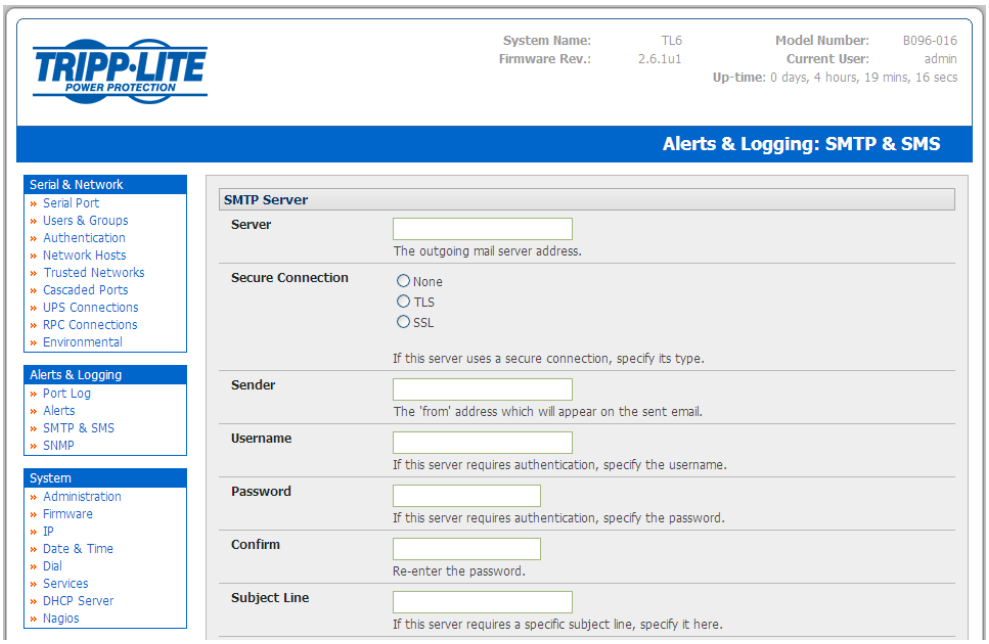
7.1 Configure SMTP/SMS/SNMP/Nagios Alert Service

The Alerts facility monitors nominated serial ports/hosts/UPSs/PDUs/EMDs, etc. for trigger conditions and, when triggered, sends an alert notification over the nominated alert service. Before setting up the alert trigger, you must configure these alert services:

7.1.1 Email Alerts

The Console Server uses SMTP (Simple Mail Transfer Protocol) for sending the email alert notifications. To use SMTP, the Administrator must configure a valid SMTP server for sending the email:

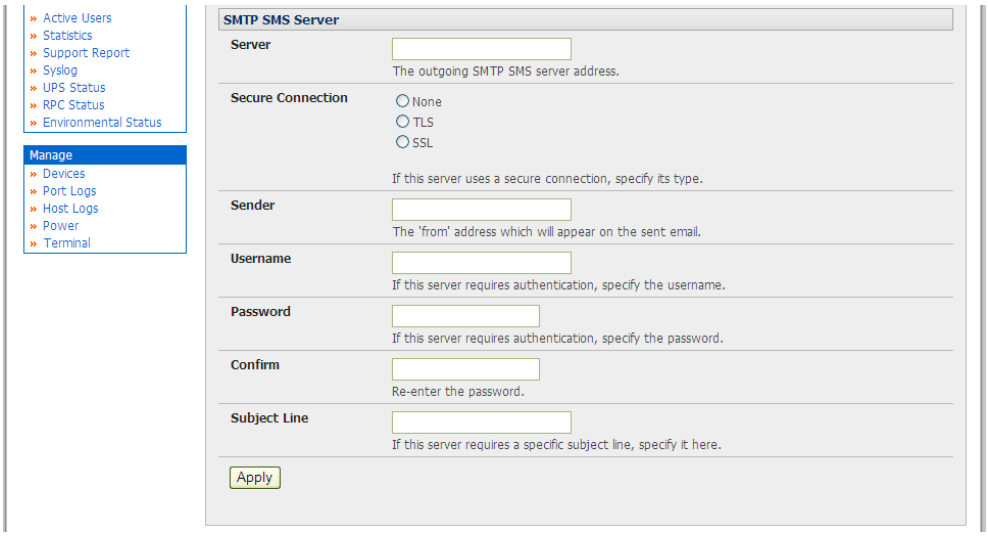
- Select Alerts & Logging: SMTP &SMS.



- In the SMTP Server field, enter the IP address of the outgoing mail Server.
- You may enter a Sender email address which will appear as the “from” address in all email notifications sent from this Console Server. Many SMTP servers check the sender’s email address with the host domain name to verify the address as authentic. So it may be useful to assign an email address for the Console Server such as consoleserver2@mydomian.com
- You may also enter a Username and Password if the SMTP server requires authentication.
- Similarly you can specify the Subject Line that will be sent with the email.
- Click Apply to activate SMTP.

7.1.2 SMS Alerts

The Console Server uses email-to-SMS services to send SMS alert notifications to mobile devices. Sending SMS via email using SMTP (Simple Mail Transfer Protocol) is much faster than sending text pages via a modem using the TAP Protocol. Almost all mobile phone carriers provide an SMS gateway service that forwards email to mobile phones on their networks. There is also a wide selection of SMS gateway aggregators who provide email to SMS forwarding to phones on any carriers. To use SMTP SMS, the Administrator must configure a valid SMTP server for sending the email:

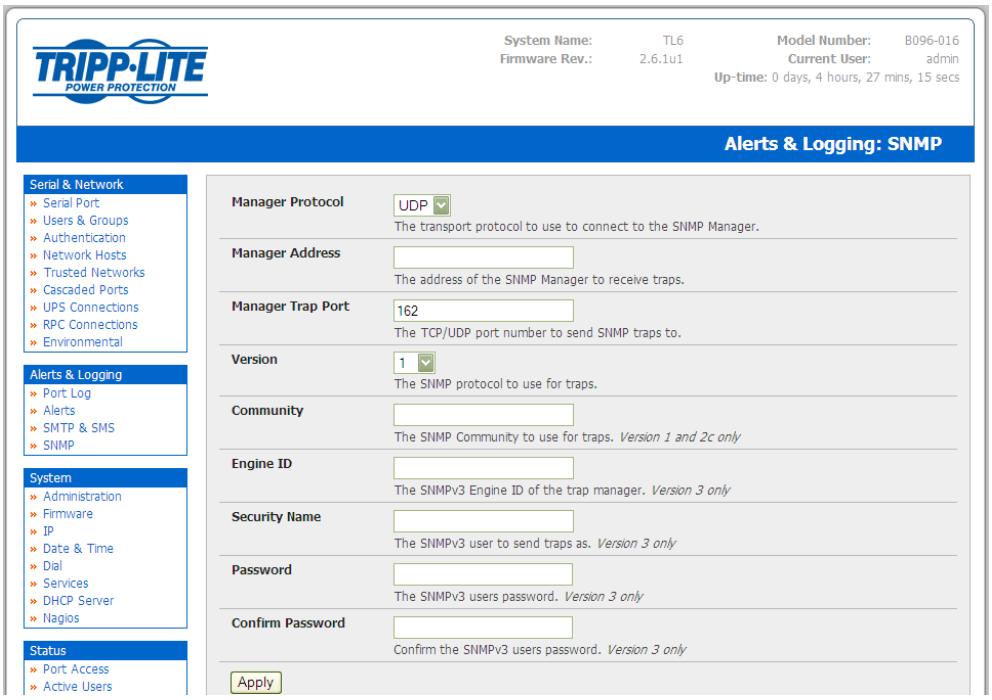


- In the SMTP SMS Server field in the Alerts & Logging: SMTP &SMS menu, enter the IP address of the outgoing mail Server.
- You may enter a Sender email address which will appear as the "from" address in all email notifications sent from this Console Server. Some SMS gateway service providers only forward email to SMS when the email has been received from authorized senders. So you may need to assign a specific authorized email address for the Console Server.
- You may also enter a Username and Password as some SMS gateway service providers use SMTP servers which require authentication.
- Similarly, you can specify the Subject Line that will be sent with the email. Generally the email subject will contain a truncated version of the alert notification message (which is contained in full in the body of the email). However, some SMS gateway service providers require blank subjects or require specific authentication headers to be included in the subject line.
- Click Apply to activate SMTP.

7.1.3 SNMP Alerts

The Administrator can configure the Simple Network Management Protocol (SNMP) agent that resides on the Console Server to send Alerts to an SNMP management application:

- Select Alerts & Logging: SNMP.
- Enter the SNMP transport protocol. SNMP is generally a UDP-based protocol though it infrequently uses TCP instead.
- Enter the IP address of the SNMP Manager and the Port to be used for connecting.
- Select the version being used. The Console Server SNMP agent supports SNMP v1, v2 and v3.
- Enter the Community name for SNMP v1 or 2c.
- To configure for SNMP v3 you will need to enter an ID and authentication password and contact information for the local Administrator (in the Security Name).
- Click Apply to activate SNMP.



Note The Console Servers have an *snmptrap* daemon to send traps/notifications to remote SNMP servers on defined trigger events, as detailed above. The Console Servers also embed the *net-snmpd* daemon which accept SNMP requests from remote SNMP management servers and provides information on network interface, running processes, disk usage, etc. (refer to *Chapter 15.5 Modifying SNMP Configuration* for more details).

7.1.4 Nagios Alerts

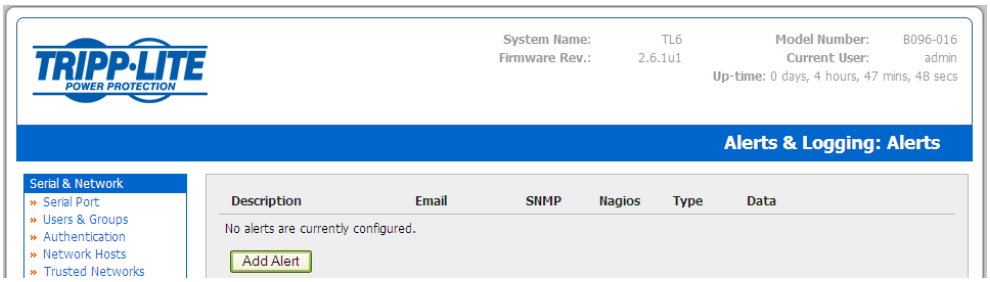
To notify the central Nagios server of Alerts, NSCA must be enabled under System: Nagios and Nagios must be enabled for each applicable host or port under Serial & Network: Network Hosts or Serial & Network: Serial Ports (refer to Chapter 10).

7.2 Activate Alert Events and Notifications

The Alert facility monitors the status of the Console Server and connected devices. When an alert event is triggered, a notification is emailed to a nominated email address or SMS gateway, or the configured SNMP or Nagios server is notified.

A wide selection of events can be used as the trigger for an alert. These events include:

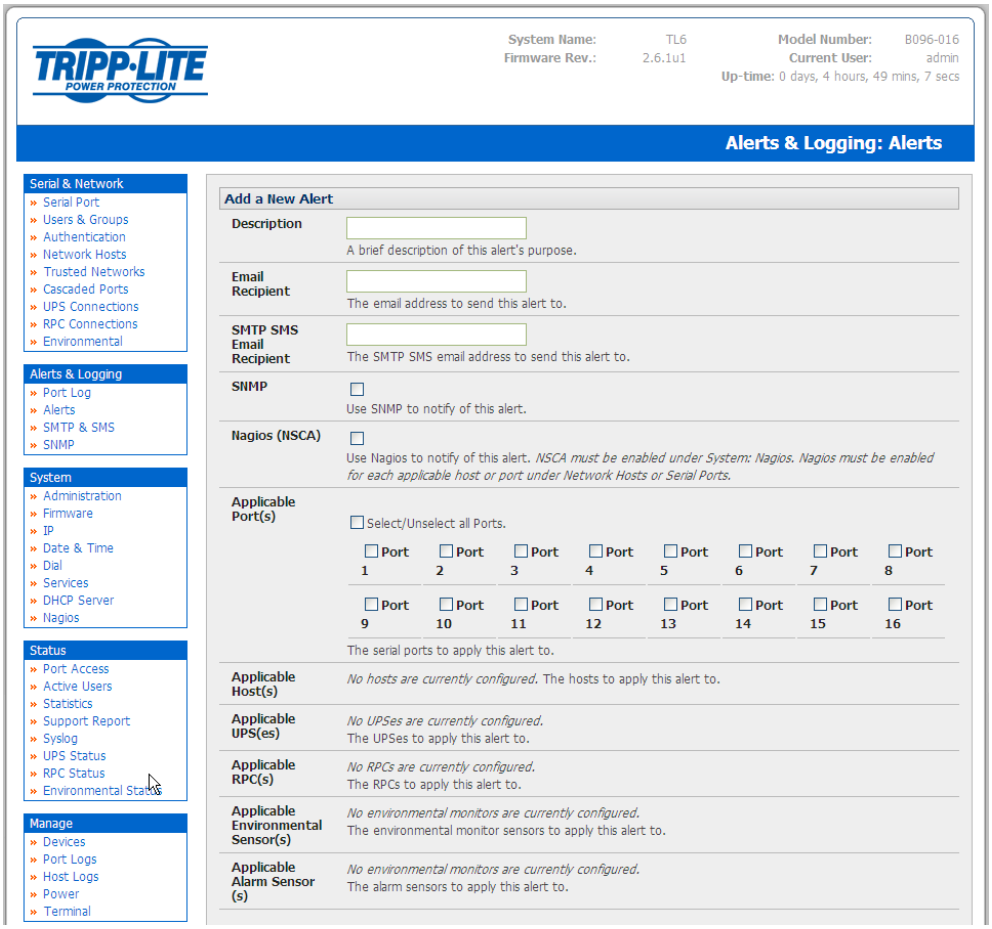
- A user establishing a remote Telnet connecting to a serial port or Host.
- Reaching a nominated low-battery level on a particular UPS or current load levels on a PDU power outlet.
- Exceeding a specified temperature or humidity level on an environmental sensor.
- Sensing a particular data pattern on a serial port (e.g. the data stream on a particular serial console may be monitored for nominated messages coming from the device such as "warning" or "IO error" and send out an alarm when they occur).



- Select Alerts & Logging: Alerts which will display all the alerts currently configured. Click Add Alert.

7.2.1 Add a New Alert

The first step is to specify the alert service that will be used to send notification for this event, who to notify, and what port/host/device is to be monitored:

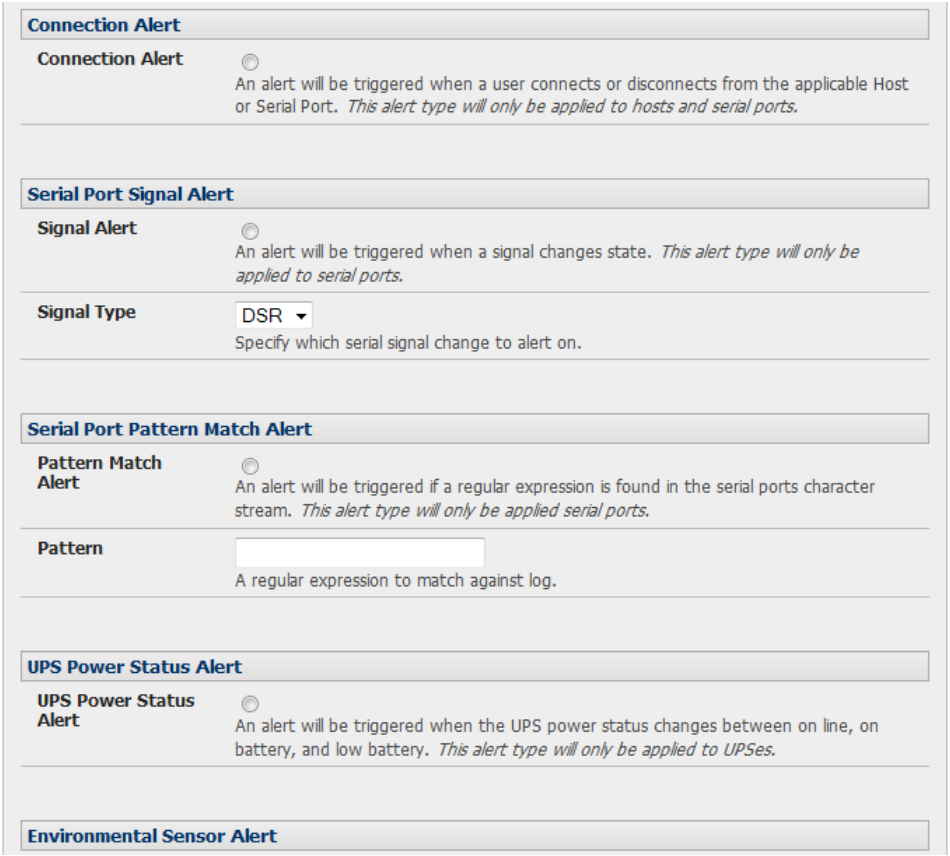

TRIPP·LITE
POWER PROTECTION
System Name: TL6
Firmware Rev.: 2.6.1u1
Model Number: B096-016
Current User: admin
Up-time: 0 days, 4 hours, 49 mins, 7 secs
Alerts & Logging: Alerts
Serial & Network
» Serial Port
» Users & Groups
» Authentication
» Network Hosts
» Trusted Networks
» Cascaded Ports
» UPS Connections
» RPC Connections
» Environmental
Alerts & Logging
» Port Log
» Alerts
» SMTP & SMS
» SNMP
System
» Administration
» Firmware
» IP
» Date & Time
» Dial
» Services
» DHCP Server
» Nagios
Status
» Port Access
» Active Users
» Statistics
» Support Report
» Syslog
» UPS Status
» RPC Status
» Environmental Status
Manage
» Devices
» Port Logs
» Host Logs
» Power
» Terminal
Add a New Alert
Description
A brief description of this alert's purpose.
Email Recipient
The email address to send this alert to.
SMTP SMS Email Recipient
The SMTP SMS email address to send this alert to.
SNMP
Use SNMP to notify of this alert.
Nagios (NSCA)
Use Nagios to notify of this alert. NSCA must be enabled under System: Nagios. Nagios must be enabled for each applicable host or port under Network Hosts or Serial Ports.
Applicable Port(s)
Select/Unselect all Ports.
Port 1 Port 2 Port 3 Port 4 Port 5 Port 6 Port 7 Port 8
Port 9 Port 10 Port 11 Port 12 Port 13 Port 14 Port 15 Port 16
The serial ports to apply this alert to.
Applicable Host(s)
No hosts are currently configured. The hosts to apply this alert to.
Applicable UPS(es)
No UPSes are currently configured.
The UPSes to apply this alert to.
Applicable RPC(s)
No RPCs are currently configured.
The RPCs to apply this alert to.
Applicable Environmental Sensor(s)
No environmental monitors are currently configured.
The environmental monitor sensors to apply this alert to.
Applicable Alarm Sensor (s)
No environmental monitors are currently configured.
The alarm sensors to apply this alert to.

- At Add a New Alert, enter a Description for this new alert.
- Nominate the email address for the Email Recipient and/or the SMS Recipient to be notified of the alert.
- Activate SNMP notification if it is to used for this event.

- Activate Nagios notification if it is to be used for this event. In an SDT Nagios centrally managed environment, you can check the Nagios alert option. On the trigger condition (for matched patterns, logins, power events and signal changes), an NSCA check "warning" result will be sent to the central Nagios server. This condition is displayed on the Nagios status screen and triggers a notification. This can cause the Nagios central server itself to send out an email or an SMS, page, etc.
- Select from the list of all configured serial ports, hosts, power units, monitors and probes which devices this new alert is to be applied to. Select Applicable Port(s) (serial) and/or Applicable Host(s) and/or Applicable UPS(es) and/or Applicable RPC(s) and/or Applicable EMD(s) and/or Applicable Alarm Sensor(s) that are to be monitored for this alert trigger.

7.2.2 Select General Alert Type

Select the Alert Type (Connection, Signal, Pattern Match, UPS Status or Environment and Power) that is to be monitored. You can configure a selection of different Alert types and any number of specific triggers:

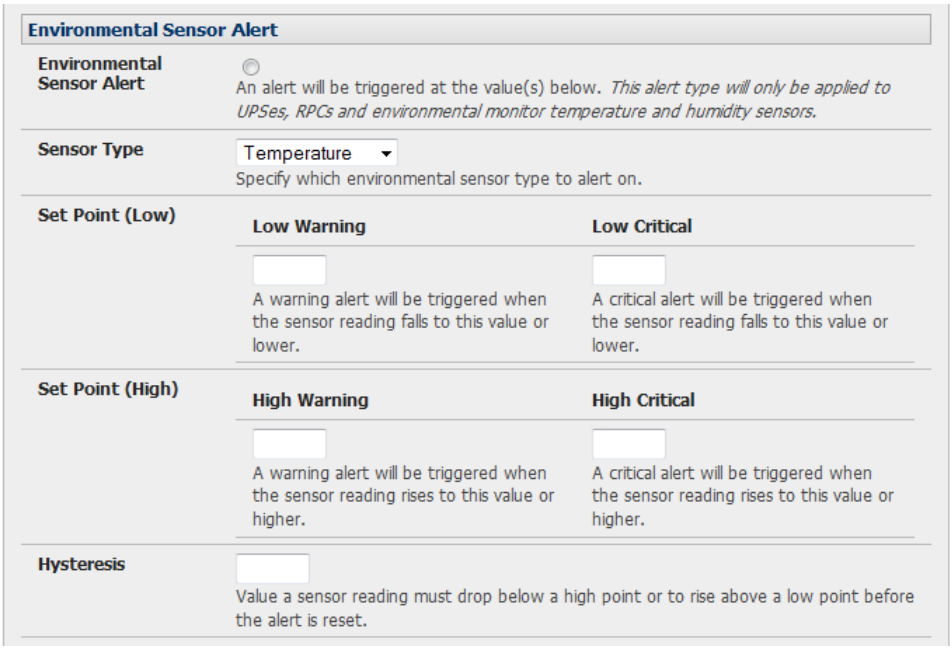

Connection Alert
Connection Alert
An alert will be triggered when a user connects or disconnects from the applicable Host or Serial Port. This alert type will only be applied to hosts and serial ports.
Serial Port Signal Alert
Signal Alert
An alert will be triggered when a signal changes state. This alert type will only be applied to serial ports.
Signal Type
DSR
Specify which serial signal change to alert on.
Serial Port Pattern Match Alert
Pattern Match Alert
An alert will be triggered if a regular expression is found in the serial ports character stream. This alert type will only be applied serial ports.
Pattern
A regular expression to match against log.
UPS Power Status Alert
UPS Power Status Alert
An alert will be triggered when the UPS power status changes between on line, on battery, and low battery. This alert type will only be applied to UPSes.
Environmental Sensor Alert

- Connection Alert - This alert will be triggered when a user connects or disconnects from the applicable Host or Serial Port, or when a Slave connects or disconnects from the applicable UPS.
- Serial Port Signal Alert - This alert will be triggered when the specified signal changes state and is applicable to serial ports only. You must specify the particular Signal Type (DSR, DCD or CTS) trigger condition that will send a new alert.

- Serial Port Pattern Match Alert – This alert will be triggered if a regular expression is found in the serial ports character stream that matches the regular expression you enter in the Pattern field. This alert type will only be applied serial ports.
- UPS Power Status Alert - This alert will be triggered when the UPS power status changes between On Line, On Battery, and Low Battery. This alert type will only be applied to UPSs.
- Environment and power alert - Refer to next section for details on selecting and configuring this alert type.

7.2.3 Configuring Environment and Power Alert Type

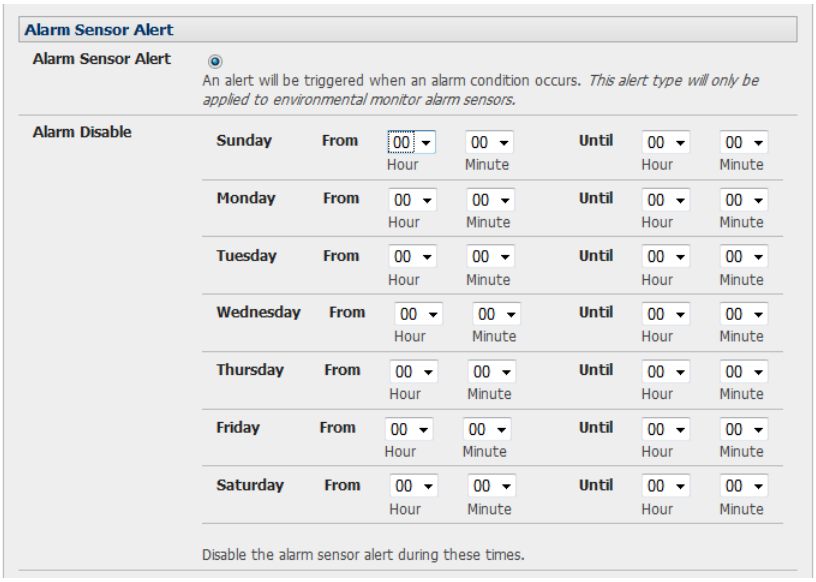
This alert type will be applied to any UPS's, RPC's and EMD temperature and humidity sensors you have nominated:


Environmental Sensor Alert
Environmental Sensor Alert
An alert will be triggered at the value(s) below. This alert type will only be applied to UPSes, RPCs and environmental monitor temperature and humidity sensors.
Sensor Type
Temperature
Specify which environmental sensor type to alert on.
Set Point (Low)
Low Warning
Low Critical
A warning alert will be triggered when the sensor reading falls to this value or lower.
A critical alert will be triggered when the sensor reading falls to this value or lower.
Set Point (High)
High Warning
High Critical
A warning alert will be triggered when the sensor reading rises to this value or higher.
A critical alert will be triggered when the sensor reading rises to this value or higher.
Hysteresis
Value a sensor reading must drop below a high point or to rise above a low point before the alert is reset.

- Select Sensor Alert to activate.
- Specify which Sensor Type to alert on (Temperature, Humidity, Power Load and Battery Charge).
- Set the levels at which Critical and/or Warning alerts are to be sent. You can also specify High and/or Low Set Points for sending alerts and the Hysteresis to be applied before resetting off the alerts.

Note Specify the **Set Point** values are in:
Degrees Celsius for Temperature
Amps (Current) for Power Load
% (Percentage) for Humidity and Battery Charge

If you have selected Applicable Alarm Sensor(s) that are to be monitored for this alert event, then you can also set time windows when these sensors will not be monitored (e.g. for a door-open sensor, you may not wish to activate the sensor alert monitoring during the working day):

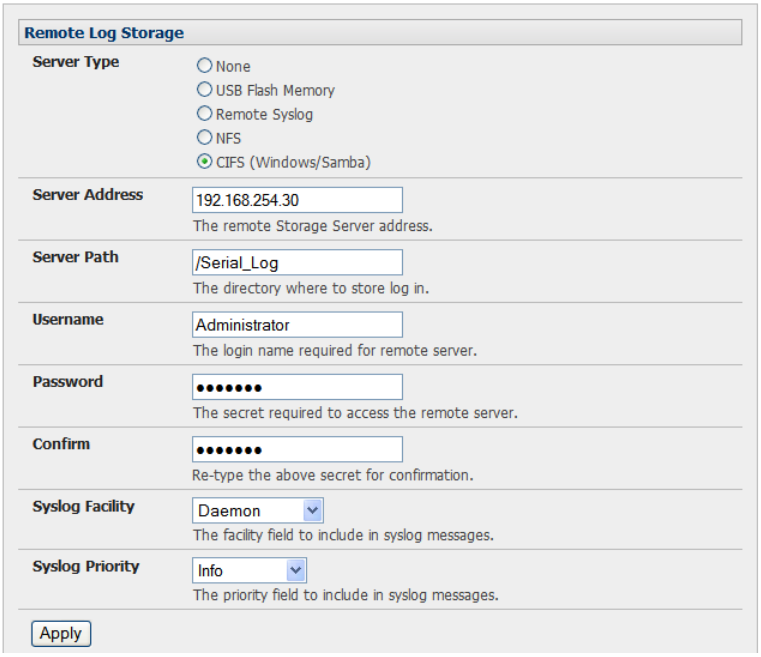

Alarm Sensor Alert
Alarm Sensor Alert
An alert will be triggered when an alarm condition occurs. This alert type will only be applied to environmental monitor alarm sensors.
Alarm Disable
Sunday From 00 Hour 00 Minute Until 00 Hour 00 Minute
Monday From 00 Hour 00 Minute Until 00 Hour 00 Minute
Tuesday From 00 Hour 00 Minute Until 00 Hour 00 Minute
Wednesday From 00 Hour 00 Minute Until 00 Hour 00 Minute
Thursday From 00 Hour 00 Minute Until 00 Hour 00 Minute
Friday From 00 Hour 00 Minute Until 00 Hour 00 Minute
Saturday From 00 Hour 00 Minute Until 00 Hour 00 Minute
Disable the alarm sensor alert during these times.

- Click Apply.

7.3 Remote Log Storage

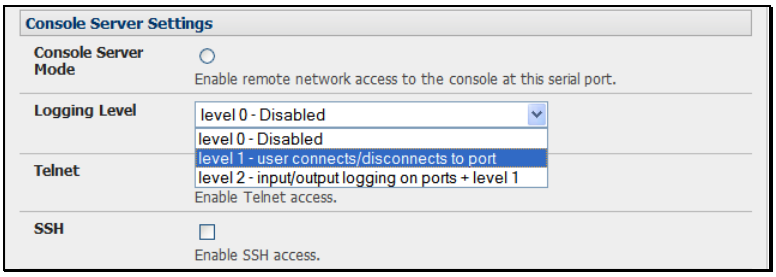
Before activating Serial or Network Port Logging on any port or UPS logging, you must specify where those logs are to be saved:

- Select the Alerts & Logging: Port Log menu option and specify the Server Type to be used, and the details to enable log server access.



7.4 Serial Port Logging

In Console Server mode, activity logs of all serial port activity can be maintained. These records are stored on an off-server, or in the Console Server flash memory. Specify which serial ports are to have activities recorded and to what level data is to be logged:


Console Server Settings
Console Server Mode
Enable remote network access to the console at this serial port.
Logging Level
level 0 - Disabled
level 0 - Disabled
level 1 - user connects/disconnects to port
level 2 - input/output logging on ports + level 1
Telnet
Enable Telnet access.
SSH
Enable SSH access.

- Select Serial & Network: Serial Port and Edit the port to be logged.
- Specify the Logging Level of for each port as:

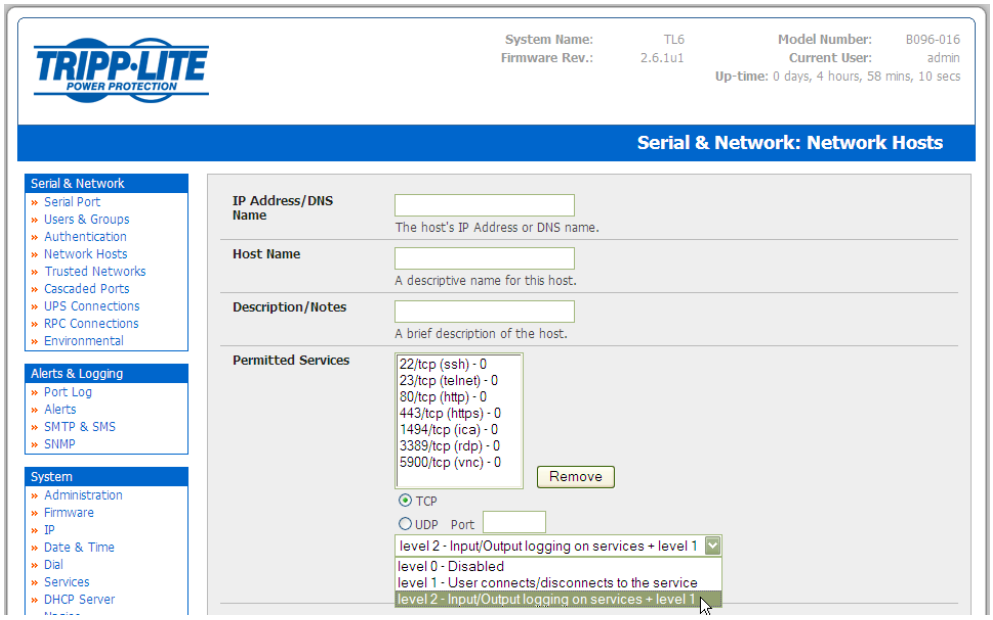
  Level 0 Turns off logging for the selected port
  Level 1 Logs all connection events to the port
  Level 2 Logs all data transferred to and from the port and all changes in hardware flow control status and all User connection events
- Click Apply.

Note A cache of the most recent 8K of logged data per serial port is maintained locally (in addition to the Logs which are transmitted for remote/USB flash storage). To view the local cache of logged serial port data, select **Manage: Port Logs.**

7.5 Network TCP or UDP Port Logging

The Console Servers can also log any access to and communications with network attached Hosts.

- For each Host, when you set up the Permitted Services which are authorized to be used, you also must set up the level of logging that is to be maintained for each service.



- Specify the logging level that is to be maintained for that particular TDC/UDP port/service on that particular Host:

Level 0	Turns off logging for the selected TDC/UDP port to the selected Host
Level 1	Logs all connection events to the port
Level 2	Logs all data transferred to and from the port

- Click Add then click Apply.

8. POWER & ENVIRONMENTAL MANAGEMENT

Introduction

The B095-004/003 and B092-016 Console Server and B096-048/016 Console Server Management Switch products embed software that can be used to manage connected Power Distribution Systems (PDU's), IPMI devices and Uninterruptible Power Supplies (UPS's) supplied by a number of vendors, and some the environmental monitoring devices. B092-016 Console Server with PowerAlert also embeds Tripp Lite's PowerAlert software.

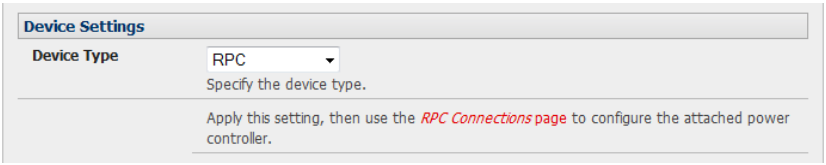
8.1 Remote Power Control (RPC)

The Console Server Management Console monitors and controls Remote Power Control (RPC) devices using the embedded PowerMan and NUT open source management tool. RPC's include power distribution units (PDU's) and IPMI power devices.

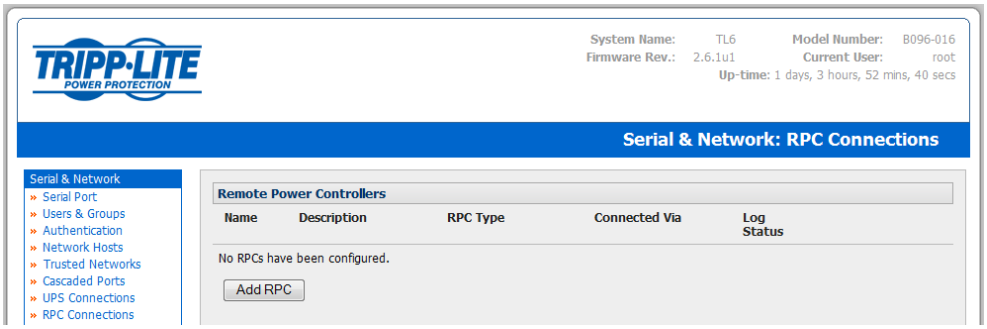
8.1.1 RPC Connection

Serial and network connected RPC's must first be connected to, and configured to communicate with, the Console Server:

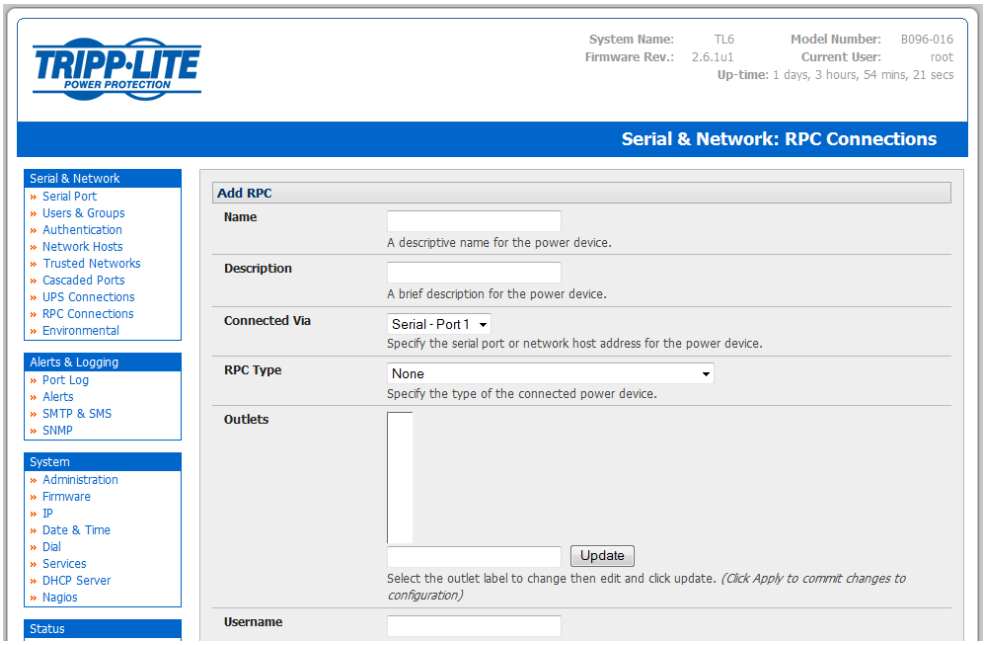
- For serial RPC's, connect the PDU to the selected serial port on the Console Server. From the Serial and Network: Serial Port menu, configure the Common Settings of that port with the RS232 properties required by the PDU (refer to Chapter 4.1.1 Common Settings). Then select RPC as the Device Type.
- Similarly for each network connected RPC, go to Serial & Network: Network Hosts menu and configure the RPC as a connected Host.


Device Settings
Device Type
RPC
Specify the device type.
Apply this setting, then use the RPC Connections page to configure the attached power controller.

- Select the Serial & Network: RPC Connections menu. This will display all the RPC connections that have already been configured.



- Click Add RPC.



- Enter a RPC Name and Description for the RPC.
- In Connected Via, select the pre-configured serial port or the network host address that connects to the RPC.
- Select any specific labels you wish to apply to specific RPC Outlets (e.g. the PDU may have 20 outlets connected to 20 powered devices you may wish to identify by name).

- Enter the Username and Password used to login into the RPC. Note that these login credentials are not related the Users and access privileges you will have configured in Serial & Networks: Users & Groups.
- Check Log Status and specify the Log Rate (minutes between samples) if you wish the status from this RPC to be logged. These logs can be views from the Status: RPC Status screen.
- Click Apply.

Note The Management Console has support for a number of network and serial PDU's. If your PDU is not on the default list, it is simple to add support for more devices. This is covered in Chapter 14: Advanced Configurations.

IPMI service processors and BMCs can be configured so all authorized users can use the Management Console to remotely cycle power and reboot computers, even when their operating

system is unresponsive. To set up IPMI power control, the Administrator first enters the IP address/domain name of the BMC or service processor (e.g. a Dell DRAC) in **Serial & Network: Network Hosts.** Then in **Serial & Network: RPC Connections,** the Administrator specifies the **RPC Type** to be IPMI1.5 or 2.0.

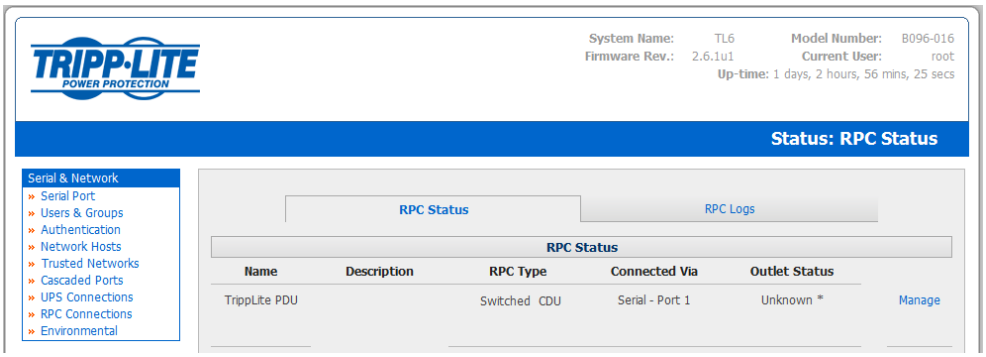
8.1.2 RPC Alerts

You can now set PDU and IPMI alerts using Alerts & Logging: Alerts (refer to Chapter 7).

8.1.3 RPC Status

You can monitor the current status of your network and serially connected PDU's and IPMI RPC's:

- Select the Status: RPC Status menu. A table with the summary status of all connected RPC hardware will be displayed.



- Click on View Log or select the RPC Logs menu. You will be presented with a table of the history and detailed graphical information on the select RPC.
- Click Manage to query or control the individual power outlet. This will take you to the Manage: Power screen.

8.1.4 User Power Management

The Power Manager enables both Users and Administrators to access and control the configured serial and network attached PDU power strips, and servers with embedded IPMI service processors or BMC's:

- Select the Manage: Power and the particular Target power device to be controlled (or click Manage on the Status: RPC Status menu).

- The outlet status is displayed. You can initiate the desired Action to be taken by selecting the appropriate icon:

  Power ON

  Power OFF

  Power Cycle

  Power Status

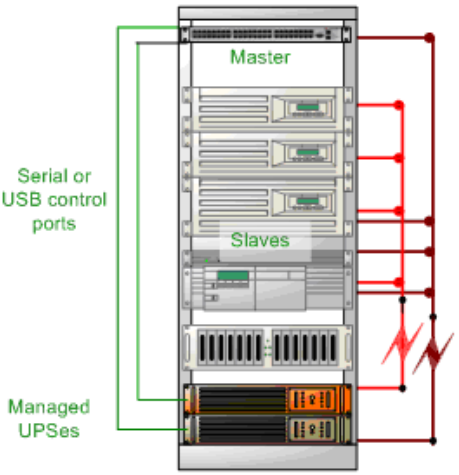
  You will only be presented with icons for those operations that are supported by the Target you have selected.

8.2 Uninterruptible Power Supply Control (UPS)

The Console Servers manage UPS hardware using Network UPS Tools (refer Section 8.2.6 for an overview of embedded open source Network UPS Tools - NUT software).

8.2.1 Managed UPS Connections

A Managed UPS is a UPS that is connected by serial or USB cable or by the network to the Console Server. The Console Server becomes the Master of this UPS, and runs a upsd server to allow other computers that are drawing power through the UPS (Slaves) to monitor its status and take appropriate action (such as shutdown in event of low battery).

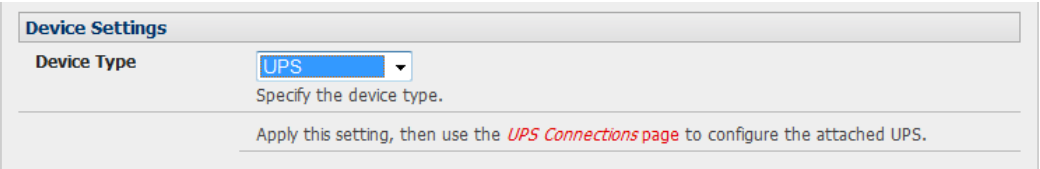


The Console Server may or may not be drawing power through the Managed UPS (see the Configure UPS powering the Console Server section below).

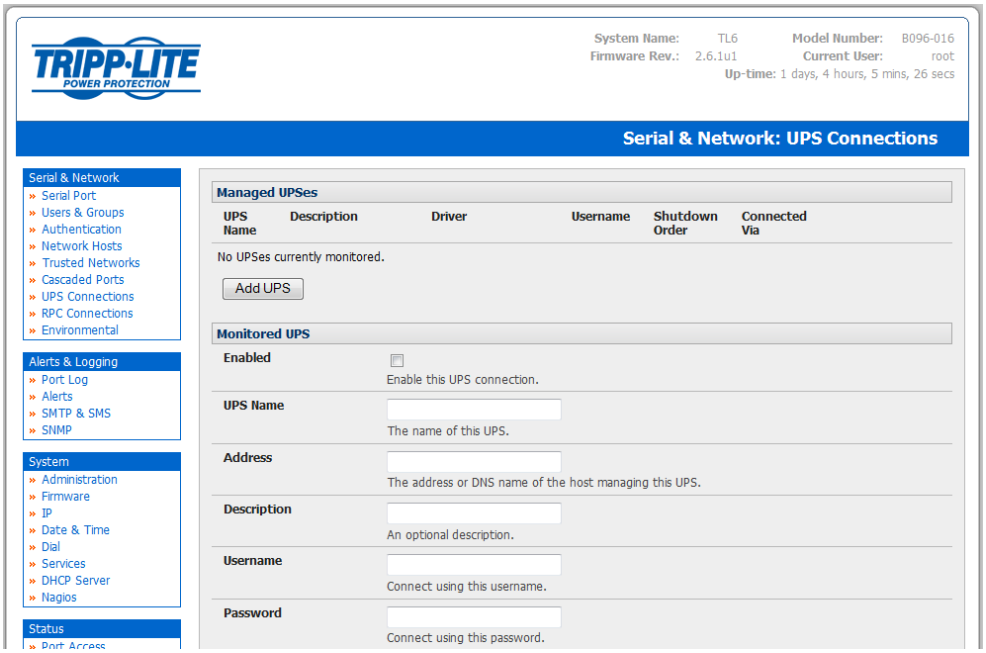
When the UPS's battery power reaches critical, the Console Server signals and waits for Slaves to shutdown, then powers off the UPS.

Serial and network connected UPS's must first be configured on the Console Server with the relevant serial control ports reserved for UPS usage, or with the UPS allocated as a connected Host:

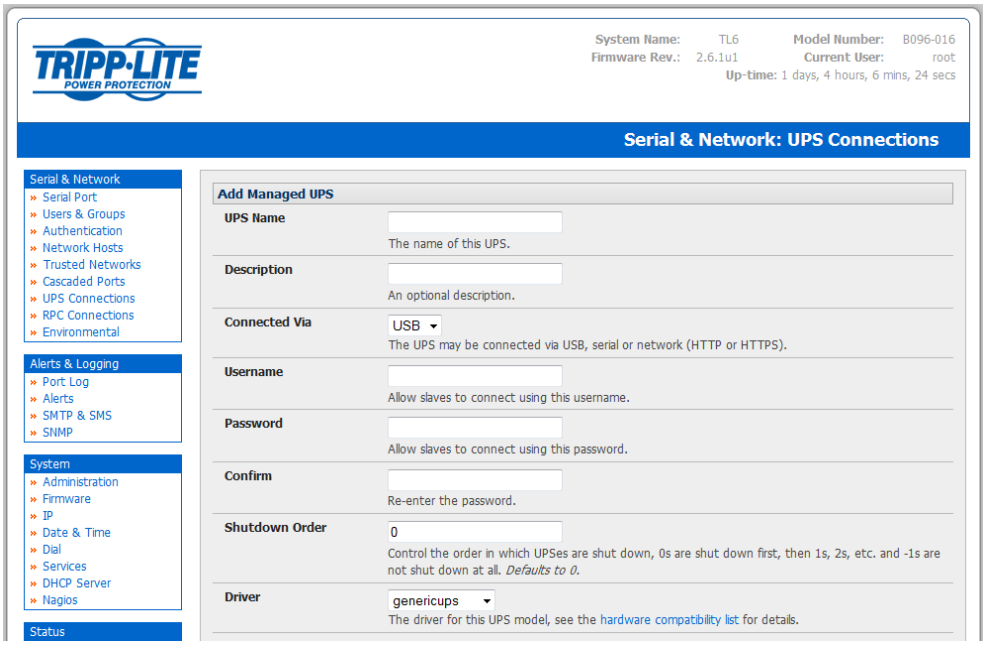
- Select UPS as the Device Type in the Serial & Network: Serial Port menu for each port which has Master control over a UPS and in the Serial & Network: Network Hosts menu for each network connected UPS (refer to Chapter 4).


Device Settings
Device Type
UPS
Specify the device type.
Apply this setting, then use the UPS Connections page to configure the attached UPS.

No such configuration is required for USB-connected UPS hardware.



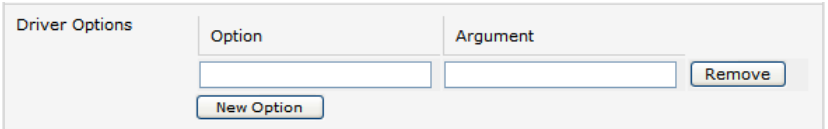
- Select the Serial & Network: UPS Connections menu. The Managed UPSs section will display all the UPS connections that have already been configured.
- Click Add UPS.



- Enter a UPS Name and Description (optional) and identify if the UPS will be Connected Via USB or over pre-configured serial port or via HTTP/HTTPS over the preconfigured network Host connection.
- Enter the UPS login details. This Username and Password is used by Slaves of this UPS (i.e. other computers that are drawing power through this UPS) to connect to the Console Server for monitoring of the UPS status and shutdown when battery power is low. Monitoring will typically be performed using the upsmon client running on the Slave server. See section 8.5.4 for details on setting up upsmon on Slave servers powered by the UPS.

Note: These login credentials are not related to the Users and access privileges you will have configured in *Serial & Networks: Users & Groups.*

- If you have multiple UPSs and require them to be shut down in a specific order, specify the Shutdown Order for this UPS. This is a positive whole number, or -1. 0s are shut down first, then 1s, 2s, etc. -1s are not shut down at all. Defaults to 0.
- Select the Driver that will be used to communicate with the UPS. The drop-down menu presents a full selection of drivers from the latest Network UPS Tools (NUT version 2.2.0) and additional information on compatible UPS hardware can be found at: http://www.networkupstools.org/compat/stable.html
- Click New Options in Driver Options if you need to set driver-specific options for your selected NUT driver and hardware combination (more details at: http://www.networkupstools.org/doc



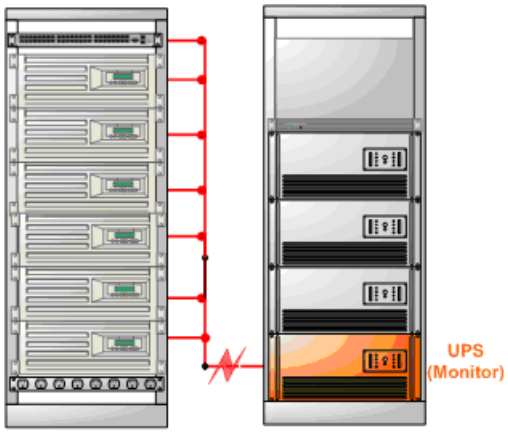
- Check Log Status and specify the Log Rate (i.e. minutes between samples) if you wish the status from this UPS to be logged. These logs can be views from the Status: UPS Status screen.
- Check Enable Nagios to enable this UPS to be monitored using Nagios central management.
- Click Apply.

You can also customize the upsmon, upsd and upsc settings for this UPS hardware directly from the command line.

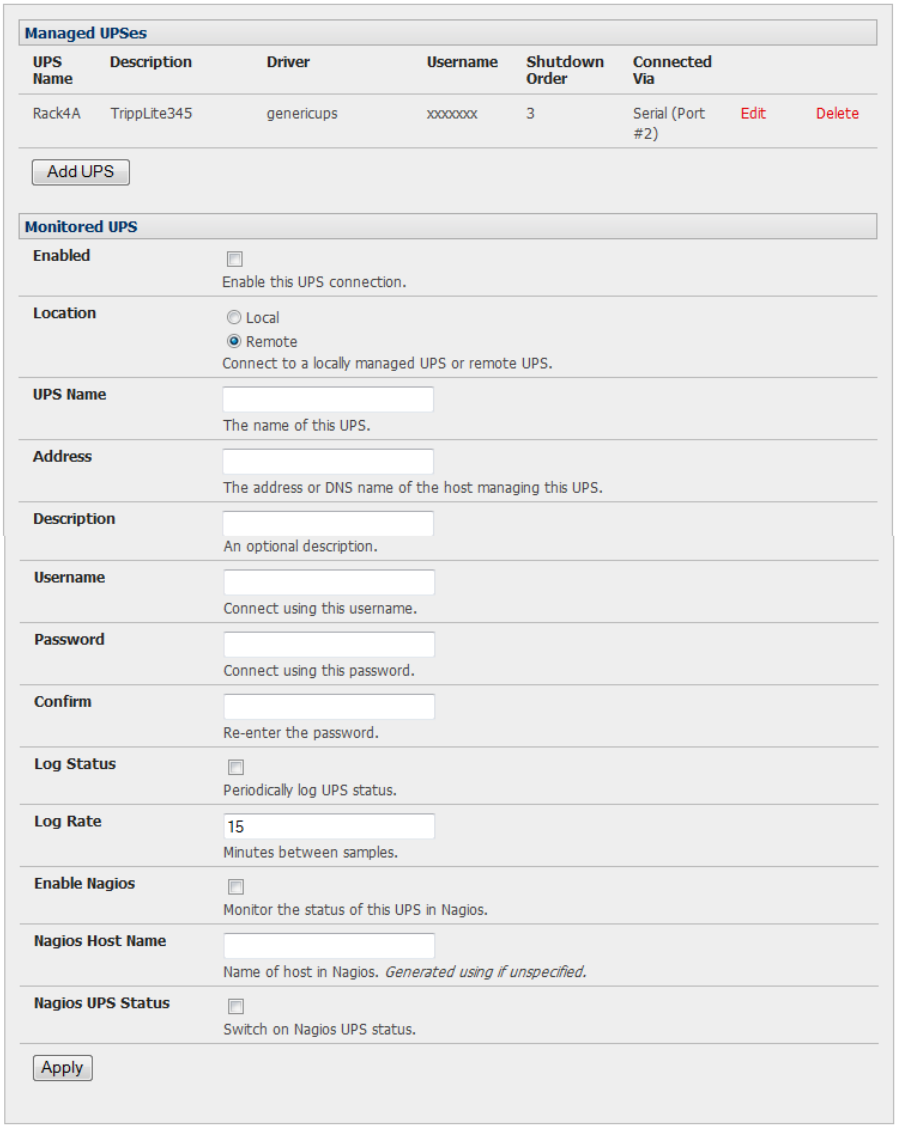
8.2.2 Configure UPS Powering the Console Server

A Monitored UPS is a UPS that is providing the power to the Console Server. The purpose of configuring a Monitored UPS is to provide an opportunity to perform any "last gasp" actions before power is lost during a power failure. This is achieved by placing a script in /etc/config/scripts/ups-shutdown. You may use the /etc/scripts/ups-shutdown as a template. This script is run when then UPS reaches critical battery status.

- If the Console Server is drawing power through a Managed UPS that has already been configured, select Local, enter the Managed UPS Name and check Enabled. The Console Server continues to be the master of this UPS.



- If the UPS that powers the Console Server is not a Managed UPS for that Console Server, then the Console Server can still connect to a remote NUT server (upsd) to monitor its status as a Slave. In this case, select Remote, and enter the address, username and password to connect.



8.2.3 Configuring Powered Computers to Monitor a Managed UPS

Once you have added a Managed UPS, each server that is drawing power through the UPS should be setup to monitor the UPS status as a Slave. This is done by installing the NUT package on each server, and setting up upsmon to connect to the Console Server.

Refer to the NUT documentation for details on how this is done, specifically sections 13.5 to 13.10. http://eu1.networkupstools.org/doc/2.2.0/INSTALL.html

An example upsmon.conf entry might look like:

MONITOR managedups@192.168.0.1 1 username password Slave

- managedups is the UPS Name of the Managed UPS

- 192.168.0.1 is the IP address of the Console Server

- 1 indicates the server has a single power supply attached to this UPS

- username is the Username of the Managed UPS

- password is the Password of the Manager UPS

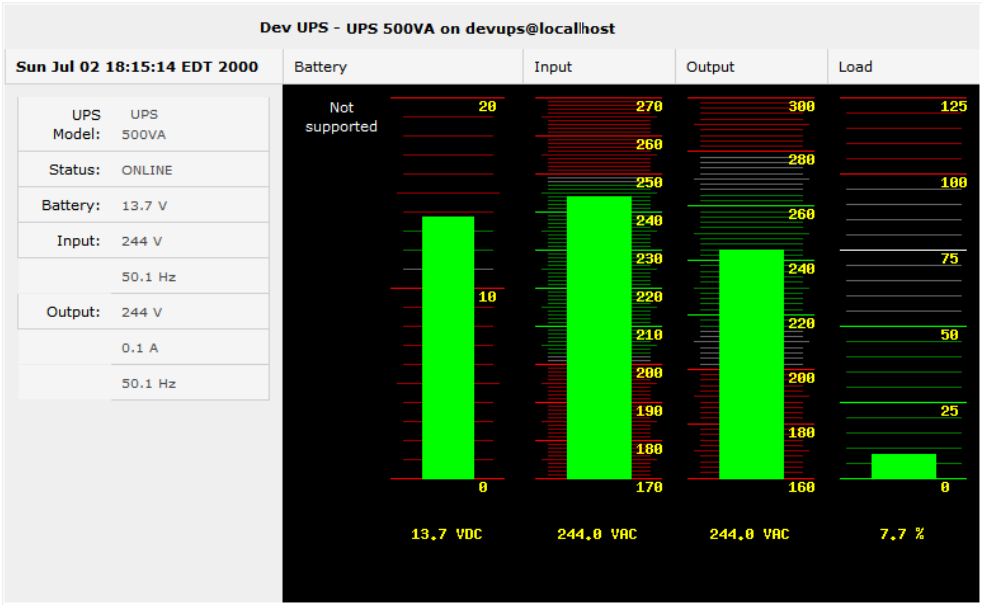
8.2.4 UPS Alerts

You can now set UPS alerts using Alerts & Logging: Alerts (refer to Chapter 7).

8.2.5 UPS Status

You can monitor the current status of all your Managed or Monitored UPSs, whether they are on the network or connected serially or via USB:

- Select the Status: UPS Status menu and a table with the summary status of all connected UPS hardware will be displayed.
- Click on any particular UPS system name in the table and you will be presented with a more detailed graphical information on the select UPS system.



- Click on any particular All Data for any UPS system in the table for more status and configuration information on the select UPS system.
- Select UPS Logs and you will be presented with the log table of the load, battery charge level, temperature and other status information from all the Managed and Monitored UPS systems. This information will be logged for all UPSs which were configured with Log Status checked. The information is also presented graphically.

8.2.6 Overview of Network UPS Tools (NUT)

Network UPS Tools (NUT) is a group of open source programs that provide a common interface for monitoring and administering UPS hardware; and ensuring safe shutdowns of the systems which are connected.

NUT can be configured using the Management Console as described above, or you can configure the tools and manage the UPS's directly from the command line. This section provides an overview of NUT. You can find full documentation at http://www.networkupstools.org/doc

NUT is built on a networked model with a layered scheme of drivers, server and clients.

1. The driver programs talk directly to the UPS equipment and run on the same host as the NUT network server upsd. Drivers are provided for a wide assortment of equipment from most of the popular UPS vendors and they understand the specific language of each UPS and map it back to a compatibility layer. This means both an expensive "smart" protocol UPS and a simple "power strip" model can be handled transparently.
2. The NUT network server program upsd is responsible for passing status data from the drivers to the client programs via the network. upsd can cache the status from multiple UPS's and can then serve this status data to many clients. upsd also contains access control features to limit the abilities of the clients (so only authorized hosts may monitor or control the UPS hardware).
3. There are a number of NUT clients that connect to upsd to check on the status of the UPS hardware and do things based on the status. These clients can run on the same host as the NUT server or they can communicate with the NUT server over the network (enabling them to monitor any UPS anywhere).

   The upsmon client enables servers that draw power through the UPS (i.e. Slaves of the UPS) to shutdown gracefully when the battery power reaches critical. Additionally, one server is designated the Master of the UPS, and is responsible for shutting down the UPS itself when all Slaves have shut down. Typically, the Master of the UPS is the one connected to the UPS via serial or USB cable.

   upsmon can monitor multiple UPS's, so high-end servers which receive power from multiple UPS's simultaneously won't initiate a shutdown until the total power situation across all source UPS's becomes critical.

   There also the two status/logging clients, upsc and upslog. The upsc client provides a quick way to poll the status of a UPS. It can be used inside shell scripts and other programs that need UPS status information. upslog is a background service that periodically polls the status of a UPS, writing it to a file.

   All these clients run on the Console Server (for Management Console presentations) but they also are run remotely (on locally powered servers and remote monitoring systems).

This layered NUT architecture enables:

- Multiple architecture support: NUT can manage serial and USB-connected models with the same common interface. SNMP equipment can also be monitored (although at this stage this is still pre-release with experimental drivers and this feature will be added to the embedded UPS tools in future release)
- Multiple clients monitoring one UPS: Multiple systems may monitor a single UPS using only their network connections. There's a wide selection of client programs which support monitoring UPS hardware via NUT (Big Sister, Cacti, Nagios, Windows and more). Refer to: www.networkupstools.org/client-projects.)

So NUT supports the more complex power architectures found in data centers, computer rooms and NOCs where many UPS's from many vendors power many systems with many clients and each of the larger UPS's power multiple devices and many of these devices are themselves dual powered.

8.3 Environmental Monitoring

The Environmental Monitoring Device (EMD), model B090-EMD, can be connected to any Console Server serial port and each Console Server can support multiple EMD's. Each EMD has one temperature and one humidity sensor and one general purpose status sensor which can be connected to a smoke detector, water detector, vibration or open-door sensor.

The B095-004/003 Console Server models have an internal temperature sensor.

Using the Management Console, Administrators can view the ambient temperature and humidity and set the EMD to automatically send alarms progressively from warning levels to critical alerts.

8.3.1 Connecting the EMD

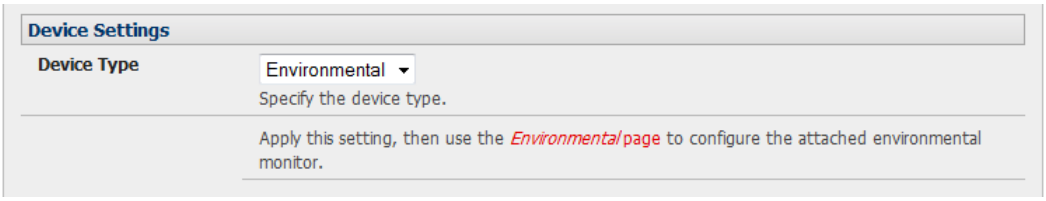
The Environmental Monitoring Sensor (EMD) connects to any serial port on the Console Server via a special EMD Adapter and standard CAT5 cable. The EMD is powered over this serial connection and communicates using a custom handshake protocol. It is not an RS232 device and should not be connected without the adapter:

- Plug the RJ plug on the EMD Adapter (model B090-EMD-ADP) into RJ45 Port on the EMD (model B090-EMD). Then connect the Console Server serial port to the RJ45 port of the EMD Adapter using the provided UTP cable. If the 6 foot (2 meter) UTP cable provided with the EMD is not long enough it can be replaced with a standard Cat5 UTP cable up to 33 feet (10meters) in length (Tripp Lite N002 series cables).

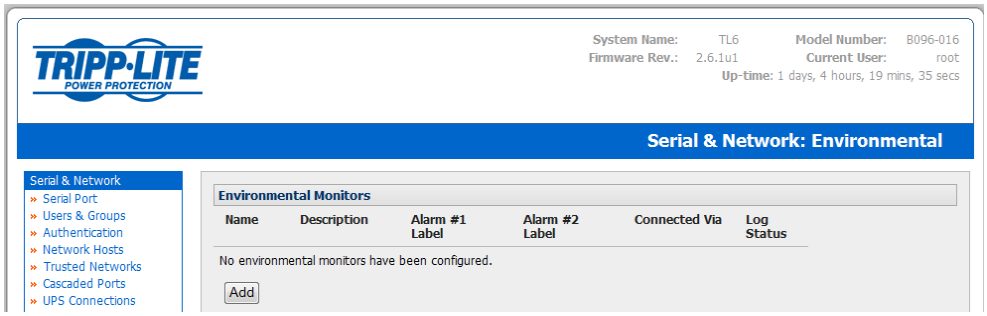
- Screw the bare wires on any smoke detector, water detector, vibration sensor, open-door sensor or general purpose open/close status sensors into the terminals on the EMD:
  - o B090-WLS Console Server Water Leak Sensor
  - o B090-DCS Console Server Door Contact Sensor
  - o B090-VS Console Server Vibration Sensor
  - o B090-SD-110 Console Server Smoke Detector - 110V
  - o B090-SD-220 Console Server Smoke Detector - 220V

The EMD can be used only with a Console Server and cannot be connected to standard RS232 serial ports on other appliances.

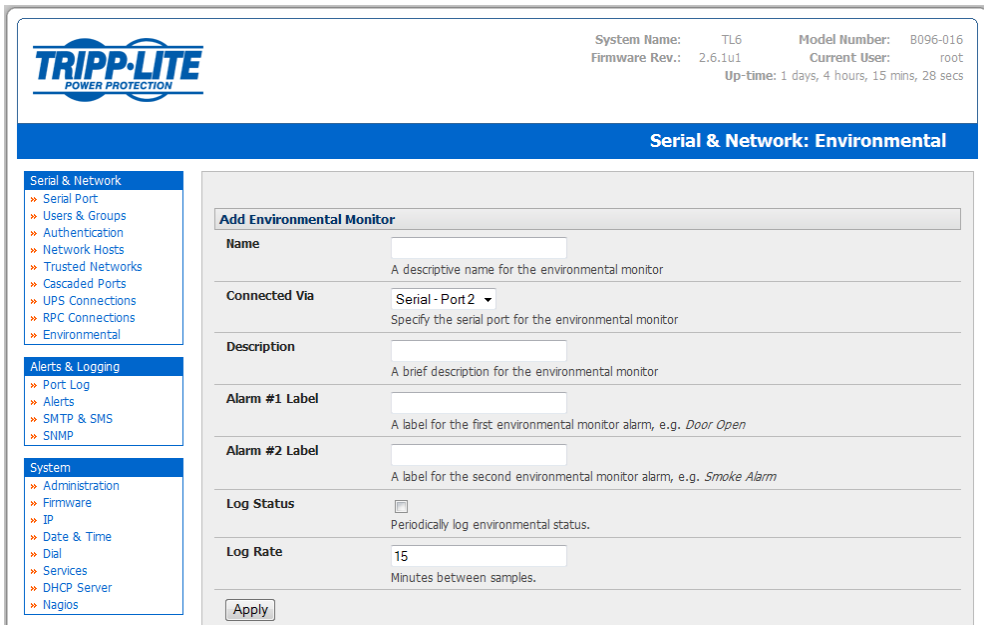
- Select Environmental as the Device Type in the Serial & Network: Serial Port menu for the port to which the EMD is to be attached. No particular Common Settings are required.
- Click Apply.


Device Settings
Device Type
Environmental
Specify the device type.
Apply this setting, then use the Environmental page to configure the attached environmental monitor.

- Select the Serial & Network: Environmental menu. This will display all the EMD connections that have already been configured.



- Click Add.



- Enter a Name and Description for the EMD and select pre-configured serial port that the EMD will be Connected Via.
- Provide Labels for each of the two alarms.
- Check Log Status and specify the Log Rate (minutes between samples) if you wish the status from this EMD to be logged. These logs can be views from the Status: Environmental Status screen.
- Click Apply.

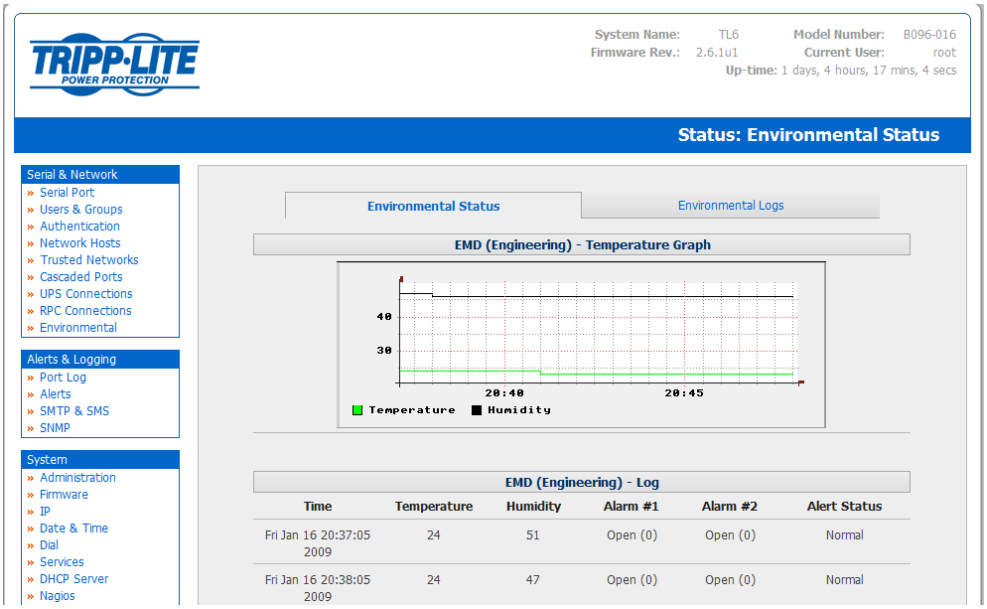
8.3.2 Environmental Alerts

You can now set temperature, humidity and probe status alerts using Alerts & Logging: Alerts (refer to Chapter 7).

8.3.3 Environmental Status

You can monitor the current status of all of EMDs and their probes:

- Select the Status: Environmental Status menu and a table with the summary status of all connected EMD hardware will be displayed.
- Click on View Log or select the Environmental Logs menu and you will be presented with a table and graphical plot of the log history of the selected EMD.



9. AUTHENTICATION

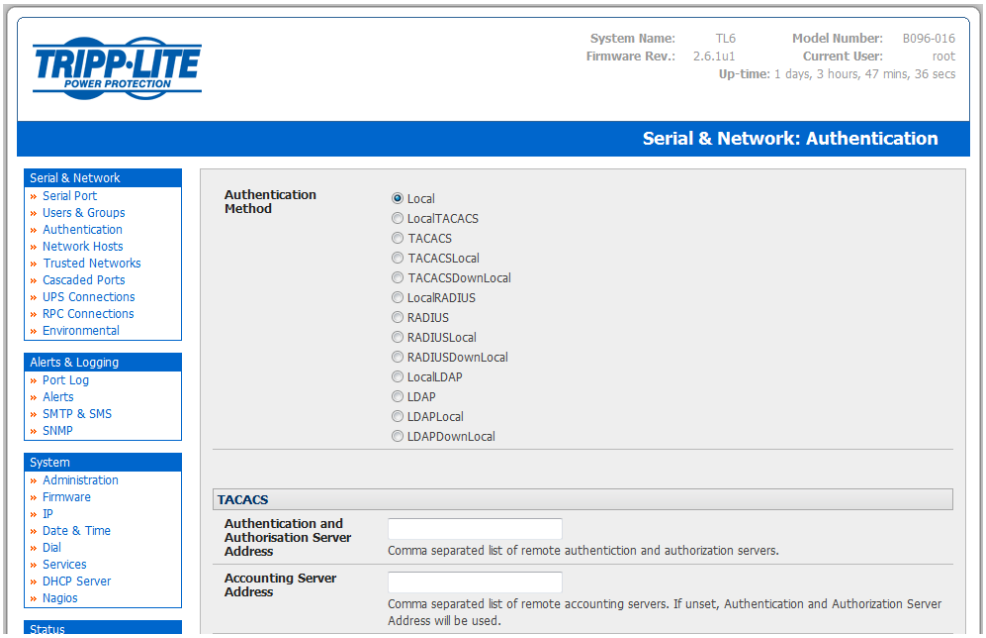
Introduction

The Tripp Lite Console Server is a dedicated Linux computer, and it embodies popular and proven Linux software modules for secure network access (OpenSSH) and communications (OpenSSL) and sophisticated user authentication (PAM, RADIUS, TACACS+ and LDAP).

- This chapter details how the Administrator can use the Management Console to establish remote AAA authentication for all connections to the Console Server and attached serial and network host devices
- This chapter also covers establishing a secure link to the Management Console using HTTPS and using OpenSSL and OpenSSH to establish a secure Administration connection to the Console Server

9.1 Authentication Configuration

Authentication can be performed locally, or remotely using an LDAP, Radius or TACACS+ authentication server. The default authentication method for the Console Server is Local.



Any authentication method that is configured will be used for authentication of any user attempting to log in through Telnet, SSH or the Web Manager to the Console Server and any connected serial port or network host devices.

The Console Server can be configured to the default (Local) or an alternate authentication method (TACACS, RADIUS or LDAP) with the option of a selected order in which local and remote authentication is to be used:

Local TACACS /RADIUS/LDAP: Tries local authentication first, falling back to remote if local fails

TACACS /RADIUS/LDAP Local: Tries remote authentication first, falling back to local if remote fails

TACACS /RADIUS/LDAP Down Local: Tries remote authentication first, falling back to local if the remote authentication returns an error condition (e.g. the remote authentication server is down or inaccessible)

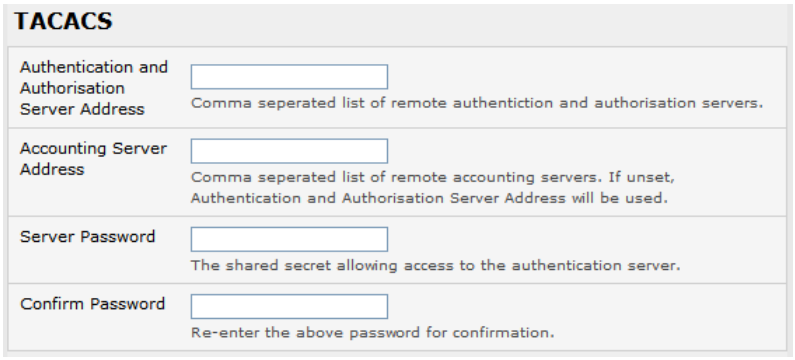
9.1.1 Local Authentication

- Select Serial and Network: Authentication and check Local.
- Click Apply.

9.1.2 TACACS Authentication

Perform the following procedure to configure the TACACS+ authentication method to be used whenever the Console Server or any of its serial ports or hosts is accessed:

- Select Serial and Network: Authentication and check TACAS or LocalTACACS or TACACSLocal or TACACSDownLocal.


TACACS
Authentication and Authorisation Server Address
Comma seperated list of remote authentiction and authorisation servers.
Accounting Server Address
Comma seperated list of remote accounting servers. If unset, Authentication and Authorisation Server Address will be used.
Server Password
The shared secret allowing access to the authentication server.
Confirm Password
Re-enter the above password for confirmation.

- Enter the Server Address (IP or host name) of the remote Authentication/Authorization server. Multiple remote servers may be specified in a comma-separated list. Each server is tried in succession.
- In addition to multiple remote servers, you can also enter for separate lists of Authentication/Authorization servers and Accounting servers. If no Accounting servers are specified, the Authentication/Authorization servers are used instead.
- Enter the Server Password.
- Click Apply. TACAS+ remote authentication will now be used for all user access to Console Server and serially or network attached devices.

TACACS+ The Terminal Access Controller Access Control System (TACACS+) security protocol is a recent protocol developed by Cisco. It provides detailed accounting information and flexible

administrative control over the authentication and authorization processes. TACACS+ allows for a single access control server (the TACACS+ daemon) to provide authentication, authorization, and accounting services independently. Each service can be tied into its own database to take advantage of other services available on that server or on the network, depending on the capabilities of the daemon. There is a draft RFC detailing this protocol. Further information on configuring remote TACACS+ servers can be found at the following sites:

http://www.cisco.com/en/US/tech/tk59/technologies_tech_note09186a0080094e99.shtml

http://www.cisco.com/en/US/products/sw/secursw/ps4911/products_user_guide_chapter09186a00800eb6d6.html

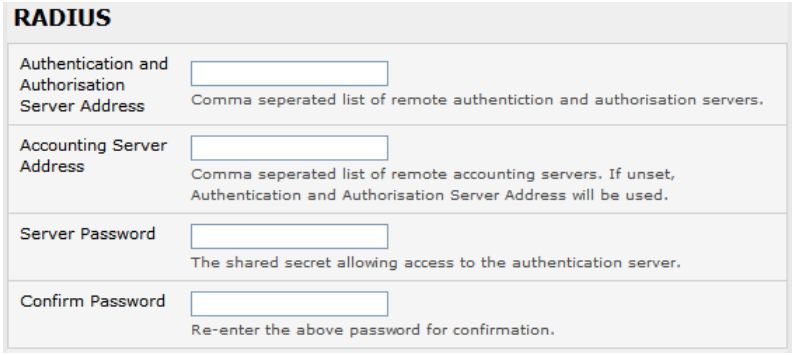
http://cio.cisco.com/univercd/cc/td/doc/product/software/ios113ed/113ed_cr/secur_c/scprt2/sctplus.htm

---

9.1.3 RADIUS Authentication

Perform the following procedure to configure the RADIUS authentication method to be used whenever the Console Server or any of its serial ports or hosts is accessed:

- Select Serial and Network: Authentication and check RADIUS or LocalRADIUS or RADIUSLocal or RADIUSDownLocal.


RADIUS
Authentication and Authorisation Server Address
Comma seperated list of remote authentiction and authorisation servers.
Accounting Server Address
Comma seperated list of remote accounting servers. If unset, Authentication and Authorisation Server Address will be used.
Server Password
The shared secret allowing access to the authentication server.
Confirm Password
Re-enter the above password for confirmation.

- Enter the Server Address (IP or host name) of the remote Authentication/ Authorization server. Multiple remote servers may be specified in a comma-separated list. Each server is tried in succession.
- In addition to multiple remote servers, you can also enter for separate lists of Authentication/Authorization servers and Accounting servers. If no Accounting servers are specified, the Authentication/Authorization servers are used instead.
- Enter the Server Password.
- Click Apply. RADIUS remote authentication will now be used for all user access to Console Server and serially or network attached devices.

RADIUS The Remote Authentication Dial-In User Service (RADIUS) protocol was developed by Livingston Enterprises as an access server authentication and accounting protocol. The RADIUS server can support a variety of methods to authenticate a user. When it is provided with the username and original password given by the user, it can support PPP, PAP or CHAP, UNIX

login, and other authentication mechanisms. Further information on configuring remote RADIUS servers can be found at the following sites:

http://www.microsoft.com/technet/prodtechnol/windowsserver2003/library/DepKit/d4fe8248-eecd-49e4-88f6-9e304f97fefc.mspx

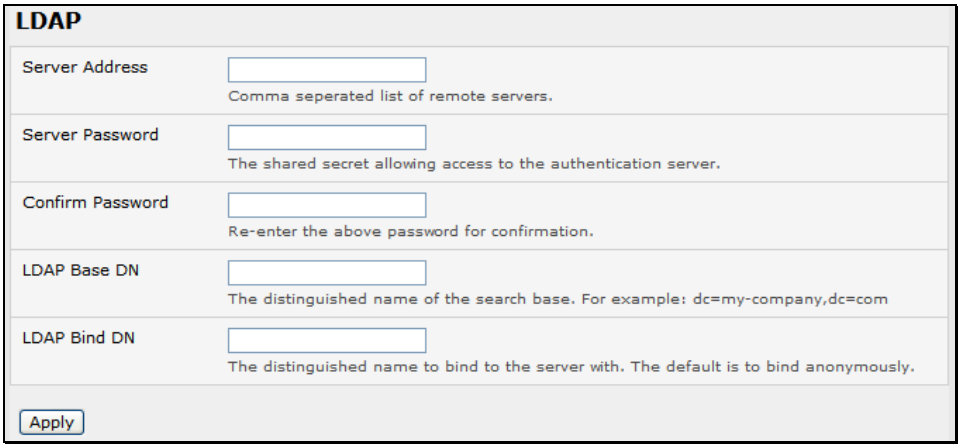
http://www.cisco.com/en/US/tech/tk59/technologies_tech_note09186a00800945cc.shtml

http://www.freeradius.org/

9.1.4 LDAP Authentication

Perform the following procedure to configure the LDAP authentication method to be used whenever the Console Server or any of its serial ports or hosts is accessed:

- Select Serial and Network: Authentication and check LDAP or LocalLDAP or LDAPLocal or LDAPDownLocal.


LDAP
Server Address
Comma seperated list of remote servers.
Server Password
The shared secret allowing access to the authentication server.
Confirm Password
Re-enter the above password for confirmation.
LDAP Base DN
The distinguished name of the search base. For example: dc=my-company,dc=com
LDAP Bind DN
The distinguished name to bind to the server with. The default is to bind anonymously.
Apply

- Enter the Server Address (IP or host name) of the remote Authentication server. Multiple remote servers may be specified in a comma-separated list. Each server is tried in succession.
- Enter the Server Password.

Note To interact with LDAP requires that the user account exist on our Console Server to work with the remote server, i.e., you can't just create the user on your LDAP server and not tell the Console Server about it. You need to add the user account.

- Click Apply. LDAP remote authentication will now be used for all user access to Console Server and serially or network attached devices.

LDAP The Lightweight Directory Access Protocol (LDAP) is based on the X.500 standard, but is significantly simpler and more readily adapted to meet custom needs. The core LDAP specifications are all defined in RFCs. LDAP is a protocol used to access information stored in an LDAP server. Further information on configuring remote RADIUS servers can be found at the following sites:

http://www.ldapman.org/articles/intro_to_ldap.html

http://www.ldapman.org/servers.html

http://www.linuxplanet.com/linuxplanet/tutorials/5050/1/

http://www.linuxplanet.com/linuxplanet/tutorials/5074/4/

9.1.5 RADIUS/TACACS User Configuration

Users may be added to the local Console Server appliance. If they are not added and they log in via remote AAA, a user will be added for them. This user will not show up in the configurators unless they are specifically added, at which point they are transformed into a completely local user. The newly added user must authenticate via the remote AAA server, and will not have any access if it is down.

If a local user logs in, they may be authenticated/authorized from the remote AAA server, depending on the chosen priority of the remote AAA. A local user's authorization is the union of local and remote privileges.

Example 1:

> User A is locally added, and has access to ports 1 and 2. He is also defined on a remote TACACS server, which says he has access to ports 3 and 4. The user may log in with either his local or TACACS password, and will have access to ports 1 through 4. If TACACS is down, he will need to use his local password, and will only be able to access ports 1 and 2.

Example 2:

> User B is only defined on the TACACS server, which says he has access to ports 5 and 6. When he attempts to log in, a new user will be created for him, and he will be able to access ports 5 and 6. If the TACACS server is down, he will not have any access.

Example 3:

> User C is defined on a RADIUS server only. He has access to all serial ports and network hosts.

Example 4:

> User D is locally defined on an appliance using RADIUS for AAA. Even if the user is also defined on the RADIUS server, he will only have access to those serial ports and network hosts he has been authorized to use on the appliance.

If a “no local AAA” option is selected, then root will still be authenticated locally.

Remote users may be added to the admin group via either RADIUS or TACACS. Users may have a set of authorizations set on the remote TACACS server. Users automatically added by RADIUS will have authorization for all resources, whereas those added locally will still need their authorizations specified.

LDAP has not been modified, and will still need locally defined users.

9.2 PAM (Pluggable Authentication Modules)

The Console Server supports RADIUS, TACACS+ and LDAP for two-factor authentication via PAM (Pluggable Authentication Modules). PAM is a flexible mechanism for authenticating Users. Nowadays, a number of new ways of authenticating users have become popular. The challenge is that each time a new authentication scheme is developed, it requires all the necessary programs (login, ftpd, etc.) to be rewritten to support it.

PAM provides a way to develop programs that are independent of authentication schemes. These programs need "authentication modules" to be attached to them at run-time in order to work. Which authentication module is to be attached is dependent upon the local system setup and is at the discretion of the local Administrator.

The Console Server family supports PAM to which we have added the following modules for remote authentication:

RADIUS	- pam_radius_auth	(http://www.freeradius.org/pam_radius_auth/)
TACACS+	- pam_tacplus	(http://echelon.pl/pubs/pam_tacplus.html)
LDAP	- pam_ldap	(http://www.padl.com/OSS/pam_ldap.html)

Further modules can be added as required.

Changes may be made to files in /etc/config/pam.d/ which will persist, even if the authentication configurator is run.

- Users added on demand:

  When a user attempts to log in, but does not already have an account on the Console Server, a new user account will be created. This account will not have any rights, and no password set. They will not appear in the configuration tools.

  Automatically added accounts will not be able to log in if the remote servers are unavailable. RADIUS users are currently assumed to have access to all resources, so will only be authorized to log in to the Console Server. RADIUS users will be authorized each time they access a new resource.

- Admin rights granted over AAA:

  Users may be granted Administrator rights via networked AAA. For TACACS, a priv-lvl of 12 of above indicates an administrator. For RADIUS, administrators are indicated via the Framed Filter ID. (See the example configuration files below, for example.)

- Authorization via TACACS for both serial ports and host access:

  Permission to access resources may be granted via TACACS by indicating an appliance and a port or networked host the user may access. (See the example configuration files below, for example.)

TACACS Example:

```
user = tim {
  service = raccess {
     priv-lvl = 11
     port1 = xxxxx/port02
```

```
        port2 = 192.168.254.145/port05
    }
    global = cleartext mit
}
```

RADIUS Example:

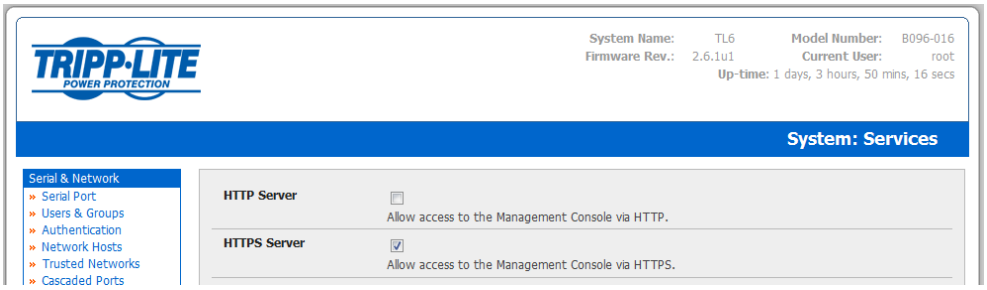
```
paul    Cleartext-Password := "luap"
        Service-Type = Framed-User,
        Fall-Through = No,
        Framed-Filter-Id=":group_name=admin"
```

The list of groups may include any number of entries separated by a comma. If the admin group is included, the user will be made an Administrator.

If there is already a Framed-Filter-Id, simply add the list of group_names after the existing entries, including the separating colon ":".

9.3 Secure Management Console Access

Selecting HTTPS Server in System: Services enables the Administrator to establish a secure browser connection Management Console:



- Activate your preferred browser and enter https:// IP address. For example, if the Console Server has been set up with an IP address of 200.122.0.12, you need to type https:// 200.122.0.12 in your address bar.
- Your browser may respond with a message that verifies the security certificate is valid but notes that it is not necessarily verified by a certifying authority. To proceed you need to click yes if you are using Internet Explorer or select accept this certificate permanently (or temporarily) if you are using Mozilla Firefox.
- You will then be prompted for the Administrator account and password as normal.

When you have a secure HTTPS connection in place, the SSL secured icon will appear at the bottom of the browser screen. You can verify the level of encryption in place by clicking on this icon.

When you first enable and connect via HTTPS, it is normal that you may receive a certificate warning. The default SSL certificate in your Console Server is embedded during testing and is not signed by a recognized third party certificate authority. Rather, it is signed by our own signing authority. These warnings do not affect the encryption protection you have against eavesdroppers.

Note More detailed information on issuing certificates and configuring HTTPS can be found in Chapter 13 – Advanced.

10. NAGIOS INTEGRATION

Introduction

Nagios is a powerful, highly extensible open source tool for monitoring network hosts and services. The core Nagios software package will typically be installed on a server or virtual server, the central Nagios server.

Tripp Lite Console Servers can operate in conjunction with a central/upstream Nagios server to provide distributing monitoring of attached network hosts and serial devices. The Console Servers can embed the NSCA (Nagios Service Checks Acceptor) and NRPE (Nagios Remote Plug-in Executor) add-ons. This allows them to communicate with the central Nagios server, eliminating the need for a dedicated Slave Nagios server at remote sites.

The Console Servers embed a basic set of distributed monitoring add-ons and can be uploaded with additional customizable distributed monitoring.

Note If you have an existing Nagios deployment, you may wish to use the Console Server in a distributed monitoring server capacity only. In this case and if you are already familiar with Nagios, skip ahead to section 10.3.

10.1 Nagios Overview

Nagios provides central monitoring of the hosts and services in your distributed network. Nagios is freely downloadable, open source software. This section offers a quick background of Nagios and its capabilities. A complete overview, FAQ and comprehensive documentation are available at: http://www.nagios.org

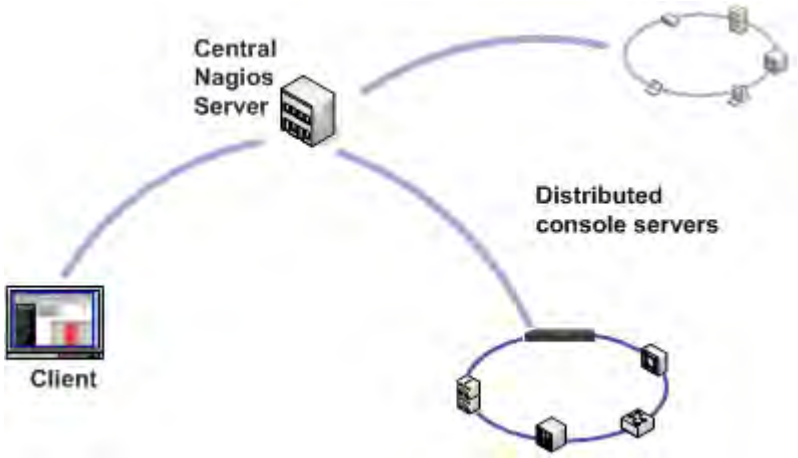
Nagios forms the core of many leading commercial system management solutions such as GroundWork: http://www.groundworkopensource.com

Nagios takes some time to install and configure, but once it is up and running, it provides an outstanding network monitoring system. With Nagios you can:

- Display tables showing the status of each monitored server and network service in real time
- Use a wide range of freely available plug-ins to make detailed checks of specific services, e.g., don't just check if a database is accepting network connections, check that it can actually validate requests and return real data
- Display warnings and send warning e-mails, pager or SMS alerts when a service failure or degradation is detected
- Assign contact groups who are responsible for specific services in specific time frames

10.2 Central Management

The Nagios solution has three parts: the Central Nagios server, Distributed Console Servers and the SDT for Nagios software.



Central Nagios server

- A vanilla Nagios 2.x or 3.x installation (typically on a Linux server)
- Generally running on a blade, PC, virtual machine, etc. at a central location
- Runs a web server that displays the Nagios GUI
- Imports configuration from distributed Console Servers

Distributed Console Servers

- B096-016 / B096-048 or B092-016 Console Servers
- Serial and network hosts are attached to each Console Server
- Each runs Nagios plug-ins, NRPE and NSCA add-ons, but not a full Nagios server

Clients

- Typically a client PC, laptop, etc. running Windows, Linux or Mac OS X
- Runs Tripp Lite SDT Connector client software 1.5.0 or later
- Connect to the central Nagios server web UI to view status of monitored hosts and serial devices
- Then use SDT Connector to connect through the distributed Console Servers, to manage monitored hosts and serial devices

10.2.1 Set Up Central Nagios Server

The Nagios server software is available for most major distributors of Linux using the standard package management tools. Your distributor will have documentation available on how to install Nagios. This is usually the quickest and simplest way to get up and running.

Note that you will need the core Nagios server package, and at least one of the NRPE or NSCA add-ons. NSCA is required to utilize the alerting features of the distributed hosts; installing both NRPE and NSCA is recommended.

You will also require a web server such as Apache to display the Nagios web UI (and this may be installed automatically as a dependency of the Nagios packages).

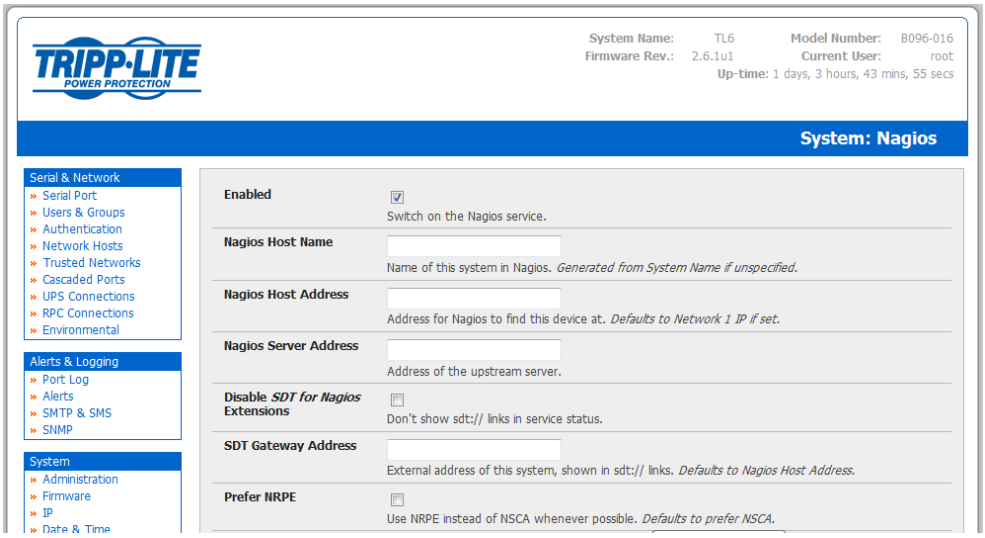
Alternatively, you may wish to download the Nagios source code directly from the Nagios website, and build and install the software from scratch. The Nagios website (http://www.nagios.org) has several Quick Start Guides that walk through this process.

Once you are able to browse to your Nagios server and see its web UI and the local services it monitors by default, you are ready to continue.

10.2.2 Set Up Distributed Console Servers

This section provides a brief walk-through on configuring a single Console Server to monitor the status of one attached network host (a Windows IIS server running HTTP and HTTPS services) and one serially attached device (the console port of a network router), and to send alerts back to the Nagios server when an administrator connects to the router or IIS server.

While this walk-through provides an example, details of the configuration options are described in the next section. This walk-through also assumes the network host and serial devices are already physically connected to the Console Server. First step is to set up the Nagios features on the Console Server:

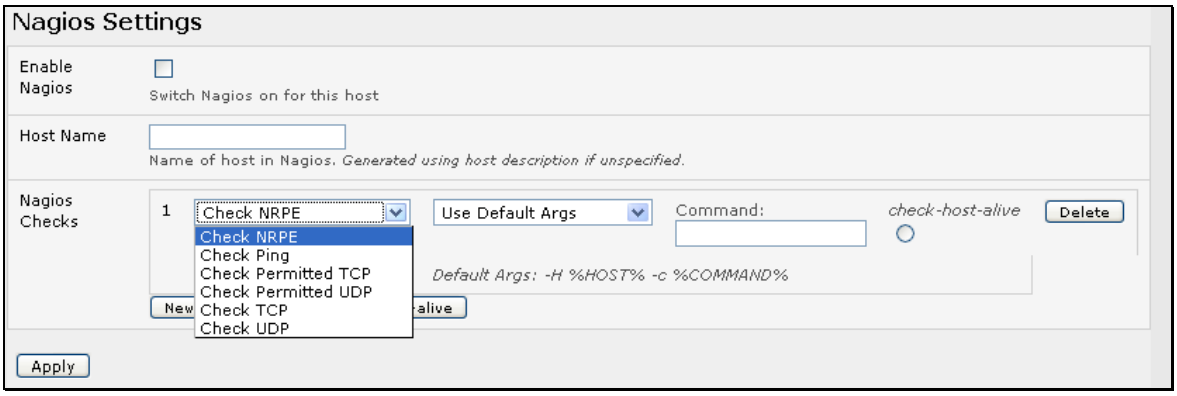

TRIPP·LITE
POWER PROTECTION
System Name: TL6
Model Number: B096-016
Firmware Rev.: 2.6.1u1
Current User: root
Up-time: 1 days, 3 hours, 43 mins, 55 secs
System: Nagios
Serial & Network
» Serial Port
» Users & Groups
» Authentication
» Network Hosts
» Trusted Networks
» Cascaded Ports
» UPS Connections
» RPC Connections
» Environmental
Alerts & Logging
» Port Log
» Alerts
» SMTP & SMS
» SNMP
System
» Administration
» Firmware
» IP
» Date & Time
Enabled
Switch on the Nagios service.
Nagios Host Name
Name of this system in Nagios. Generated from System Name if unspecified.
Nagios Host Address
Address for Nagios to find this device at. Defaults to Network 1 IP if set.
Nagios Server Address
Address of the upstream server.
Disable SDT for Nagios Extensions
Don't show sdt:// links in service status.
SDT Gateway Address
External address of this system, shown in sdt:// links. Defaults to Nagios Host Address.
Prefer NRPE
Use NRPE instead of NSCA whenever possible. Defaults to prefer NSCA.

- Browse the Console Server and select System: Nagios on the Console Server Management Console. Check Nagios service Enabled.
- Enter the Host Name and the Nagios Host Address (i.e. IP address) that the central Nagios server will use to contact the distributed Console Server.
- Enter the IP address that the distributed Console Server will use to contact the central Nagios server in Nagios Server Address.
- Enter the IP address that the clients running SDT Connector will use to connect through the distributed Console Servers in SDT Gateway address.
- Check Prefer NRPE, NRPE Enabled and NRPE Command Arguments.

- Check NSCA Enabled, choose an NSCA Encryption Method and enter and confirm an NSCA Secret. Remember these details as you will need them later on. For NSCA Interval, enter 5.
- Click Apply.

Next, configure the attached Window network host and specify the services you will be checking with Nagios (HTTP and HTTPS):

- Select Network Hosts from the Serial & Network menu and click Add Host.
- Enter the IP Address/DNS Name of the network server, (e.g.: 192.168.1.10) and enter a Description, (e.g.: Windows 2003 IIS Server).
- Remove all Permitted Services. This server will be accessible using Terminal Services, so check TCP, Port 3389 and log level 1 and click Add. It is important to remove and re-add the service to enable logging.



- Scroll down to Nagios Settings and check Enable Nagios.
- Click New Check and select Check Ping. Click check-host-alive.
- Click New Check and select Check Permitted TCP. Select Port 3389.
- Click New Check and select Check TCP. Select Port 80.
- Click New Check and select Check TCP. Select Port 443.
- Click Apply.

Similarly, configure the serial port to the router to be monitored by Nagios:

- Select Serial Port from the Serial & Network menu.
- Locate the serial port that has the router console port attached and click Edit.
- Ensure the serial port settings under Common Settings are correct and match the attached router's console port.
- Click Console Server Mode and select Logging Level 1.
- Check Telnet (SSH access is not required, as SDT Connector is used to secure the otherwise unsecured Telnet connection).
- Scroll down to Nagios Settings and check Enable Nagios.
- Check Port Log and Serial Status.

- Click Apply.

Now set the Console Server to send alerts to the Nagios server:

- Select Alerts from the Alerts & Logging menu and click Add Alert.
- In Description enter: Administrator connection.
- Check Nagios (NSCA).
- In Applicable Ports check the serial port that has the router console port attached. In Applicable Hosts check the IP address/DNS name of the IIS server.
- Click Connection Alert.
- Click Apply.

Lastly, add a User for the client running SDT Connector:

- Select Users & Groups from the Serial & Network menu.
- Click Add User.
- In Username, enter: sdtnagiosuser, then enter and confirm a Password.
- In Accessible Hosts click the IP address/DNS name of the IIS server. In Accessible Ports click the serial port that has the router console port attached.
- Click Apply.

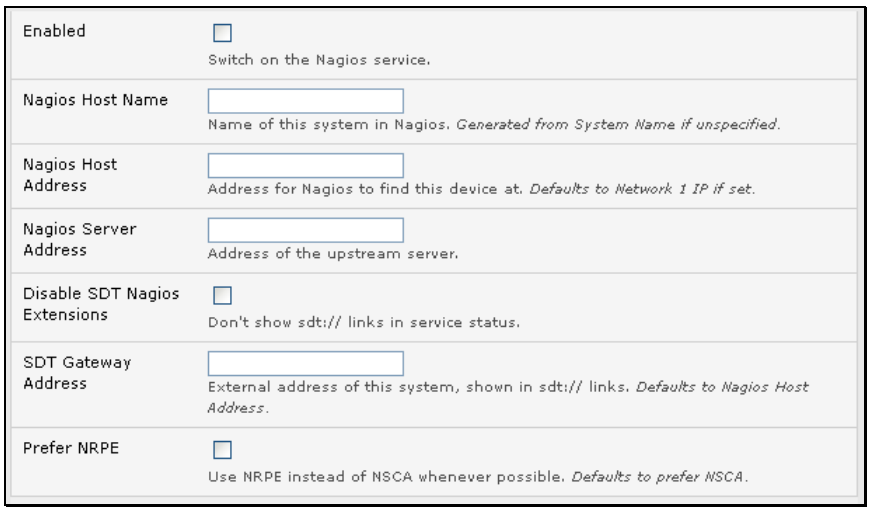
10.3 Configuring Nagios Distributed Monitoring

To activate the Console Server's Nagios distributed monitoring:

- Nagios integration must be enabled and a path established to the central/upstream Nagios server
- If the Console Server is to periodically report on Nagios-monitored services, then the NSCA client embedded in the Console Server must be configured: the NSCA program enables scheduled check-ins with the remote Nagios server and is used to send passive check results across the network to the remote server
- If the Nagios server is to actively request status updates from the Console Server, then the NRPE server embedded in the Console Server must be configured – the NRPE server is the Nagios daemon for executing plug-ins on remote hosts
- Each of the Serial Ports and each of the Hosts connected to the Console Server which are to be monitored must have Nagios enabled and any specific Nagios checks configured
- Lastly the central/upstream Nagios monitoring host must be configured

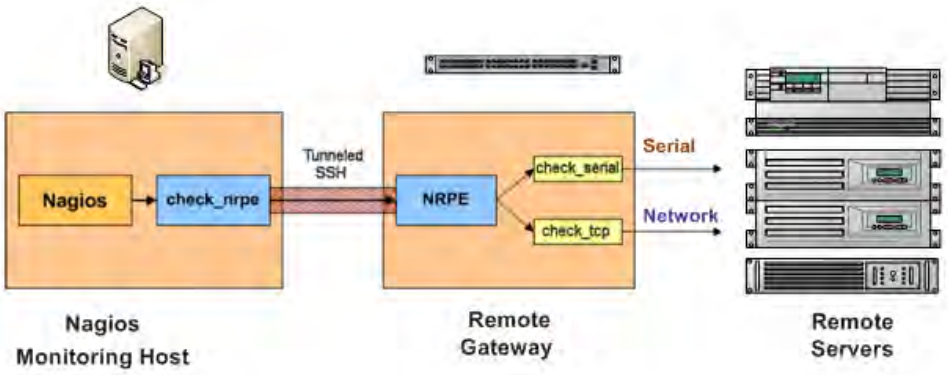
10.3.1 Enable Nagios on the Console Server

- Select System: Nagios on the Console Server Management Console and tick the Nagios service Enabled.

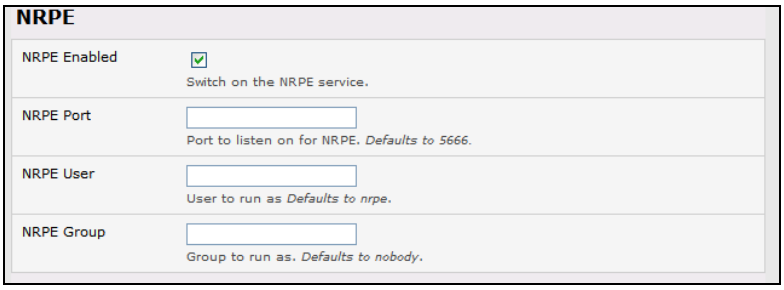

Enabled
Switch on the Nagios service.
Nagios Host Name
Name of this system in Nagios. Generated from System Name if unspecified.
Nagios Host Address
Address for Nagios to find this device at. Defaults to Network 1 IP if set.
Nagios Server Address
Address of the upstream server.
Disable SDT Nagios Extensions
Don't show sdt:// links in service status.
SDT Gateway Address
External address of this system, shown in sdt:// links. Defaults to Nagios Host Address.
Prefer NRPE
Use NRPE instead of NSCA whenever possible. Defaults to prefer NSCA.

- Enter the Nagios Host Name that the Console Server will be referred to in the Nagios central server – this will be generated from local System Name (entered in System: Administration) if unspecified.
- In Nagios Host Address, enter the IP address or DNS name that the upstream Nagios server will use to reach the Console Server – if unspecified this will default to the first network port's IP as entered in System: IP).
- In Nagios Server Address, enter the IP address or DNS name that the Console Server will use to reach the upstream Nagios monitoring server.
- Check the Disable SDT Nagios Extensions option if you wish to disable the SDT Connector integration with your Nagios server at the head end – this would only be checked if you want to run a vanilla Nagios monitoring.
- If not, enter the IP address or DNS name the SDT Nagios clients will use to reach the Console Server in SDT Gateway Address.
- When NRPE and NSCA are both enabled, NSCA is preferred method for communicating with the upstream Nagios server – check Prefer NRPE to use NRPE whenever possible (i.e. for all communication except for alerts).

10.3.2 Enable NRPE Monitoring



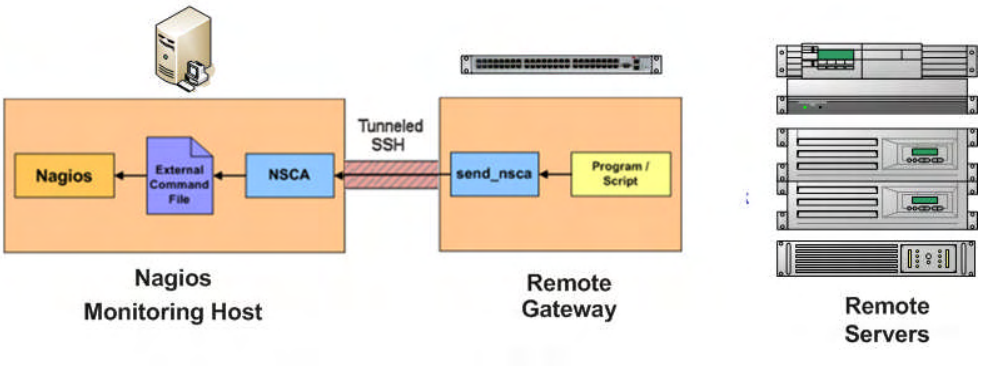
Enabling NRPE allows you to execute plug-ins (such as check_tcp and check_ping) on the remote Console Server to monitor serial or network attached remote servers. This will offload CPU load from the upstream Nagios monitoring machine which is especially valuable if you are monitoring hundreds or thousands of hosts. To enable NRPE:


NRPE
NRPE Enabled
Switch on the NRPE service.
NRPE Port
Port to listen on for NRPE. Defaults to 5666.
NRPE User
User to run as Defaults to nrpe.
NRPE Group
Group to run as. Defaults to nobody.

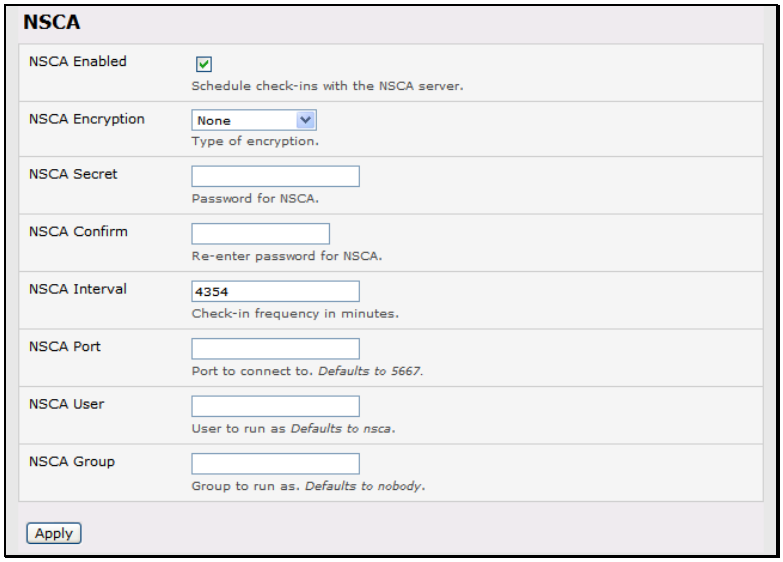
- Select System: Nagios and check NRPE Enabled.
- Enter the details for the user connection to the upstream Nagios monitoring server. Again, refer to the sample Nagios configuration example below for details of configuring specific NRPE checks.

By default, the Console Server will accept a connection between the upstream Nagios monitoring server and the NRPE server with SSL encryption, without SSL, or tunneled through SSH. The security for the connection is configured at the Nagios server.

10.3.3 Enable NSCA Monitoring



NSCA is the mechanism that allows you to send passive check results from the remote Console Server to the Nagios daemon running on the monitoring server. To enable NSCA:



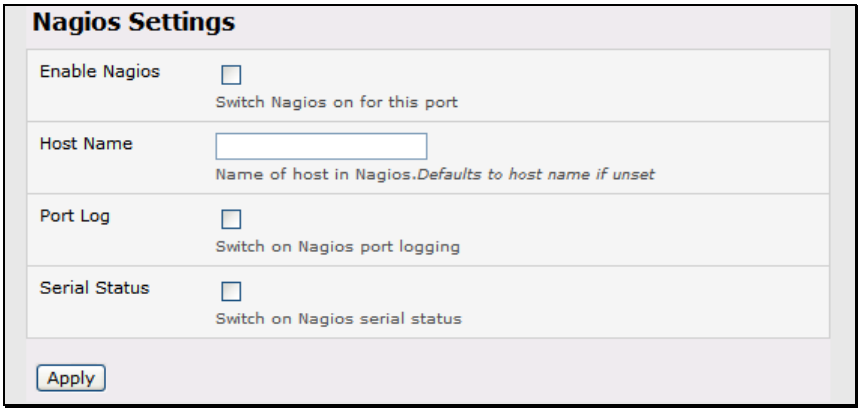
- Select System: Nagios and check NSCA Enabled.
- Select the Encryption to be used from the drop-down menu, then enter a Secret password and specify a check Interval.
- Refer the sample Nagios configuration section below for some examples of configuring specific NSCA checks.

10.3.4 Configure Selected Serial Ports for Nagios Monitoring

The individual Serial Ports connected to the Console Server to be monitored must be configured for Nagios checks. Refer to Chapter 4.4: Network Host Configuration for details on enabling Nagios monitoring for Hosts that are network connected to the Console Server. To enable Nagios to monitor a device connected to the Console Server serial port:

- Select Serial & Network: Serial Port and click Edit on the serial Port # to be monitored.

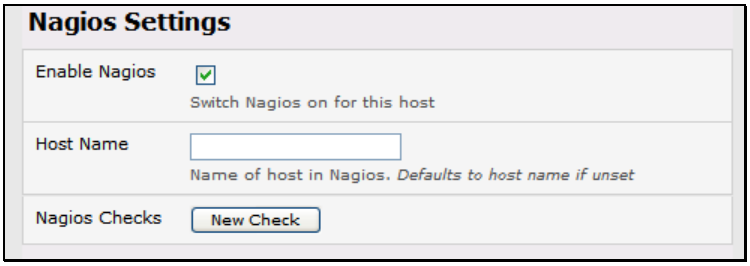
- Select Enable Nagios, specify the name of the device on the upstream server and determine the check to be run on this port. Serial Status monitors the handshaking lines on the serial port and Check Port monitors the data logged for the serial port.



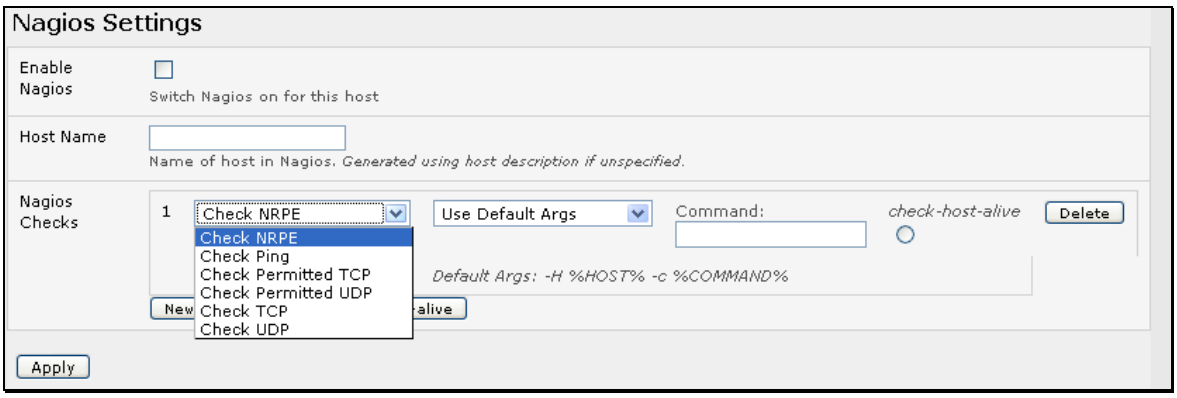
10.3.5 Configure Selected Network Hosts for Nagios Monitoring

The individual Network Hosts connected to the Console Server that is to be monitored must also be configured for Nagios checks:

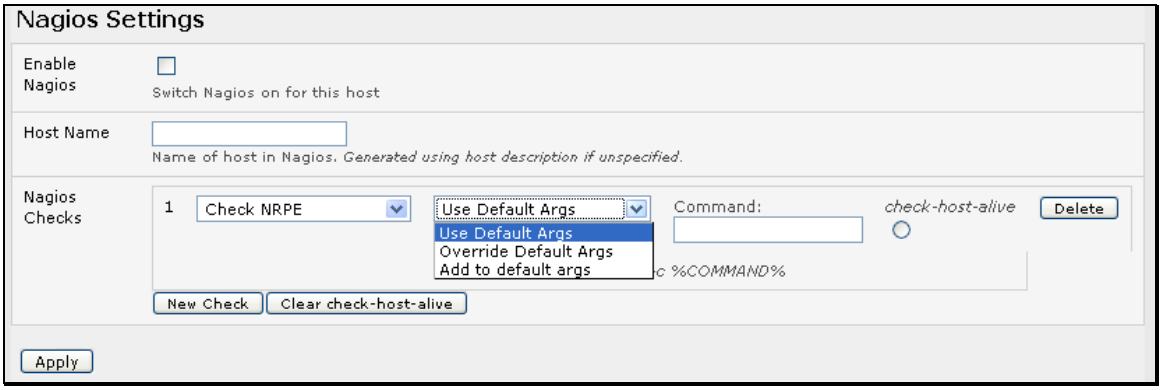
- Select Serial & Network: Network Port and click Edit on the Network Host to be monitored.



- Select Enable Nagios, specify the name of the device as it will appear on the upstream Nagios server.
- Click New Check to add a specific check which will be run on this host.
- Select Check Permitted TCP/UDP to monitor a service that you have previously added as a Permitted Service.
- Select Check TCP/UDP to specify a service port that you wish to monitor, but do not wish to allow external (SDT Connector) access.
- Select Check TCP to monitor.



- The Nagios Check nominated as the check-host-alive check is used to determine whether the network host itself is up or down.
- Typically this will be Check Ping – although in some cases the host will be configured not to respond to pings.
- If no check-host-alive check is selected, the host will always be assumed to be up.
- You may deselect check-host-alive by clicking Clear check-host-alive.
- If required, customize the selected Nagios Checks to use custom arguments.
- Click Apply.



10.3.6 Configure the Upstream Nagios Monitoring Host

Refer to the Nagios documentation (http://www.nagios.org/docs/) for configuring the upstream server:

- The section entitled Distributed Monitoring steps through what is needed to configure NSCA on the upstream server (under Central Server Configuration).
- NRPE Documentation, which has been recently added, steps through configuring NRPE on the upstream server http://nagios.sourceforge.net/docs/nrpe/NRPE.pdf

At this stage, Nagios at the upstream monitoring server is configured, and individual serial port and network host connections on the Console Server are configured for Nagios monitoring. If NSCA is enabled, each selected check will be executed once over the period of the check interval. If NRPE is enabled, then the upstream server will be able to request status updates under its own scheduling.

10.4 Advanced Distributed Monitoring Configuration

10.4.1 Sample Nagios Configuration

An example configuration for Nagios is listed below. It shows how to set up a remote Console Server to monitor a single host, with both network and serial connections. Each check has two configurations, one for NRPE and one for NSCA. In practice, these would be combined into a single check which uses NSCA as a primary method and falling back to NRPE if a check were late. For details, see the Nagios documentation (http://www.nagios.org/docs/) on Service and Host Freshness Checks.

```
; Host definitions
;
; Console Server
define host{
        use             generic-host
        host_name       tripplite
        alias           Console Server
        address         192.168.254.147
        }

; Managed Host
define host{
        use             generic-host
        host_name       server
        alias           server
        address         192.168.254.227
        }

; NRPE daemon on gateway
define command {
        command_name    check_nrpe_daemon
        command_line  $USER1$/check_nrpe -H 192.168.254.147 -p 5666
        }

define service {
        service_description     NRPE Daemon
        host_name               tripplite
        use                     generic-service
        check_command                   check_nrpe_daemon
        }

; Serial Status
define command {
        command_name    check_serial_status
        command_line  $USER1$/check_nrpe -H 192.168.254.147 -p 5666 -c check_serial_$HOSTNAME$
        }

define service {
```

```
        service_description     Serial Status
        host_name               server
        use                     generic-service
        check_command                   check_serial_status
        }

define service {
        service_description     serial-signals-server
        host_name               server
        use                     generic-service
        check_command                   check_serial_status
        active_checks_enabled   0
        passive_checks_enabled          1
        }

define servicedependency{
        name                            tripplite_nrpe_daemon_dep
        host_name                       tripplite
        dependent_host_name             server
        dependent_service_description   Serial Status
        service_description             NRPE Daemon
        execution_failure_criteria      w,u,c
        }

; Port Log
define command{
        command_name    check_port_log
        command_line    $USER1$/check_nrpe -H 192.168.254.147 -p 5666 -c port_log_$HOSTNAME$
    }

define service {
        service_description     Port Log
        host_name               server
        use                     generic-service
        check_command                   check_port_log
        }

define service {
        service_description     port-log-server
        host_name               server
        use                     generic-service
        check_command                   check_port_log
        active_checks_enabled   0
        passive_checks_enabled          1
        }

define servicedependency{
        name                            tripplite_nrpe_daemon_dep
```

```
        host_name                       tripplite
        dependent_host_name             server
        dependent_service_description   Port Log
        service_description             NRPE Daemon
        execution_failure_criteria      w,u,c
        }

; Ping
define command{
        command_name    check_ping_via_tripplite
        command_line    $USER1$/check_nrpe -H 192.168.254.147 -p 5666 -c host_ping_$HOSTNAME$
    }

define service {
        service_description     Host Ping
        host_name               server
        use                     generic-service
        check_command                   check_ping_via_tripplite
        }

define service {
        service_description     host-ping-server
        host_name               server
        use                     generic-service
        check_command                   check_ping_via_tripplite
        active_checks_enabled   0
        passive_checks_enabled          1
        }

define servicedependency{
        name                            tripplite_nrpe_daemon_dep
        host_name                       tripplite
        dependent_host_name             server
        dependent_service_description   Host Ping
        service_description             NRPE Daemon
        execution_failure_criteria      w,u,c
        }

; SSH Port
define command{
    command_name    check_conn_via_tripplite
    command_line    $USER1$/check_nrpe -H 192.168.254.147 -p 5666 -c
host_$HOSTNAME$_$ARG1$_$ARG2$
    }

define service {
        service_description     SSH Port
        host_name               server
```

```
        use                     generic-service
        check_command                   check_conn_via_tripplite!tcp!22
        }

define service {
        service_description     host-port-tcp-22-server
                                ; host-port-<protocol>-<port>-<host>
        host_name               server
        use                     generic-service
        check_command                   check_conn_via_tripplite!tcp!22
        active_checks_enabled   0
        passive_checks_enabled          1
        }

define servicedependency{
        name                            tripplite_nrpe_daemon_dep
        host_name                       tripplite
        dependent_host_name             server
        dependent_service_description   SSH Port
        service_description             NRPE Daemon
        execution_failure_criteria      w,u,c
        }
```

10.4.2 Basic Nagios Plug-Ins

Plug-ins are compiled executables or scripts that can be scheduled to be run on the Console Server to check the status of a connected host or service. This status is then communicated to the upstream Nagios server which uses the results to monitor the current status of the distributed network. Each Console Server is preconfigured with a selection of the checks that are part of the Nagios plug-ins package:

check_tcp and check_udp are used to check open ports on network hosts.

check_ping is used to check network host availability.

check_nrpe is used to execute arbitrary plug-ins in other devices.

Each Console Server is also preconfigured with two checks that are specific to the Console Server:

check_serial_signals is used to monitor the handshaking lines on the serial ports.

check_port_log is used to monitor the data logged for a serial port.

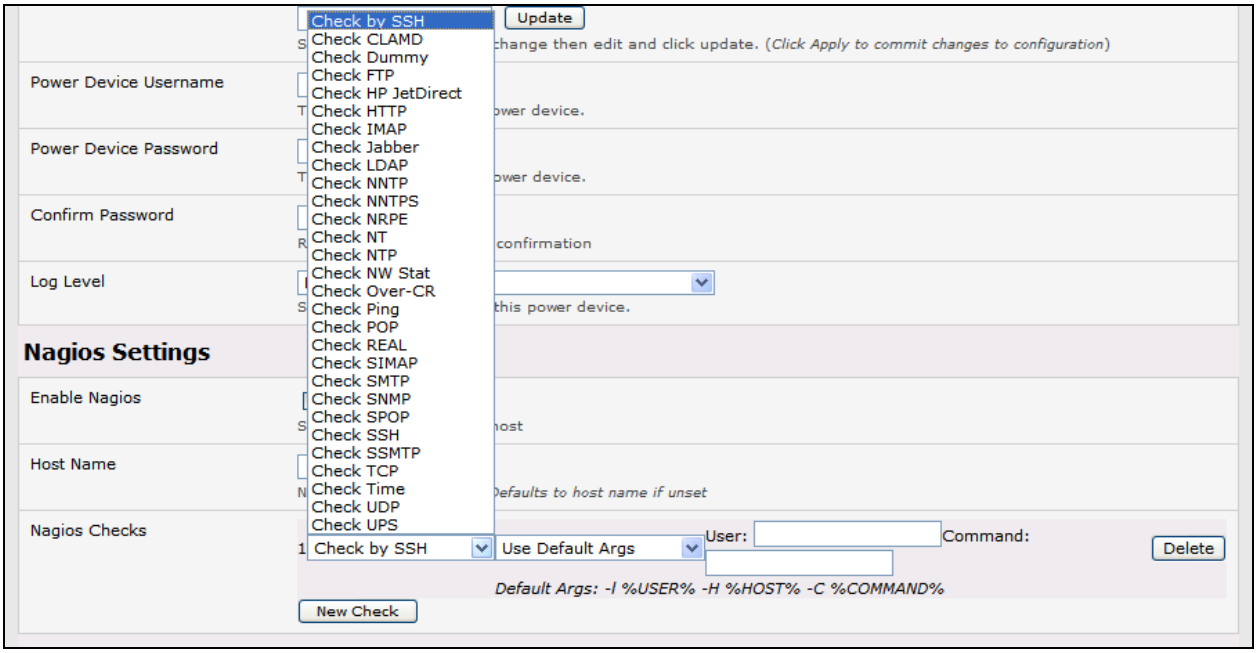
10.4.3 Additional Plug-Ins

Additional Nagios plug-ins (listed below) are available for all the Tripp Lite Console Servers:

check_apt	check_http	check_nt	check_snmp
check_by_ssh	check_imap	check_ntp	check_spop
check_clamd	check_jabber	check_nwstat	check_ssh
check_dig	check_ldap	check_overcr	check_ssmtp
check_dns	check_load	check_ping	check_swap
check_dummy	check_mrtg	check_pop	check_tcp
check_fping	check_mrtgtraf	check_procs	check_time
check_ftp	check_nagios	check_real	check_udp
check_game	check_nntp	check_simap	check_ups
check_hpjd	check_nntps	check_smtp	check_users

There also are bash scripts which can be downloaded and run (primarily check_log.sh).

- To configure additional checks, the downloaded plug-in program must be saved in the tftp addins directory on the USB flash and the downloaded text plug-in file saved in /etc/config
- To enable these new additional checks, you select Serial&Network: Network Port, then you Edit the Network Host to be monitored, and select New Checks. The additional check option will have been included in the updated Nagios Checks list. You can again customize the arguments:



11. SYSTEM MANAGEMENT

Introduction

This chapter describes how the Administrator can perform a range of general system administration and configuration tasks on the Console Server, such as:

- Applying Soft and Hard Resets to the gateway
- Re-flashing the firmware
- Configuring the Date, Time and NTP
- Setting up Backup of the configuration files (B095-004/003 only)
- Configuring the console server in FIPS mode(B095-004/003 only)

System administration and configuration tasks covered elsewhere include:

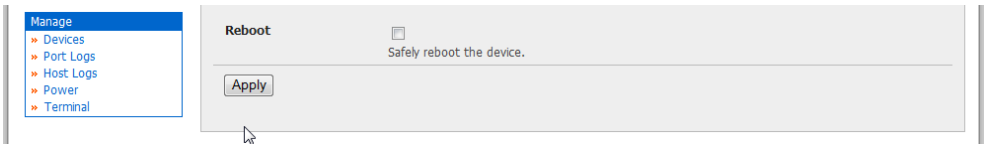
- Resetting the System Password and entering a new System Name and Description for the Console Server (Chapter 3.2)
- Setting the Console Server's System IP Address (Chapter 3. 3)
- Setting the permitted Services used to access the Console Server (Chapter 3.4)
- Setting up OoB Dial-in (Chapter 5)
- Configuring the Dashboard (B095-004/003 only) (Chapter 12)

11.1 System Administration and Reset

The Administrator can reboot or reset the Console Server to default settings.

A soft reset is performed by:

- Selecting Reboot in the System: Administration menu and clicking Apply.



The Console Server reboots with all settings (e.g., the assigned network IP address) preserved. However this soft reset does disconnect all Users and ends any SSH sessions that had been established.

A soft reset will also be performed when you switch OFF power to the Console Server, and then switch the power back ON. However, if you cycle the power while the unit is writing to flash, you could corrupt or lose data. Therefore, the software reboot is the safer option.

A hard erase (hard reset) is performed by:

- Pushing the Erase button on the rear panel twice. The reset button on the B095-003-1E-M and B095-004-1E is on the side of the unit. A ball point pen or bent paper clip is a suitable tool for

performing this procedure. Do not use a graphite pencil. Depress the button gently twice (within a 5 second period) while the unit is powered ON.

This will reset the Console Server back to its factory default settings and clear the Console Server's stored configuration information.

The hard erase will clear all custom settings and return the unit back to factory default settings (i.e. the IP address will be reset to 192.168.0.1).

You will be prompted to log in and must enter the default administration username and administration password:

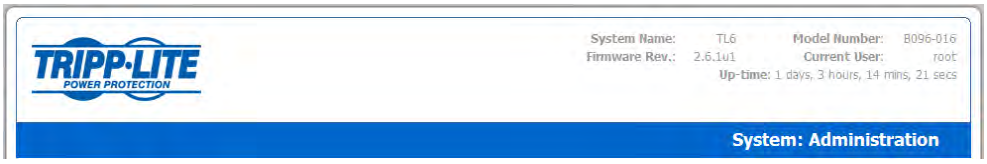
Username: root

Password: default

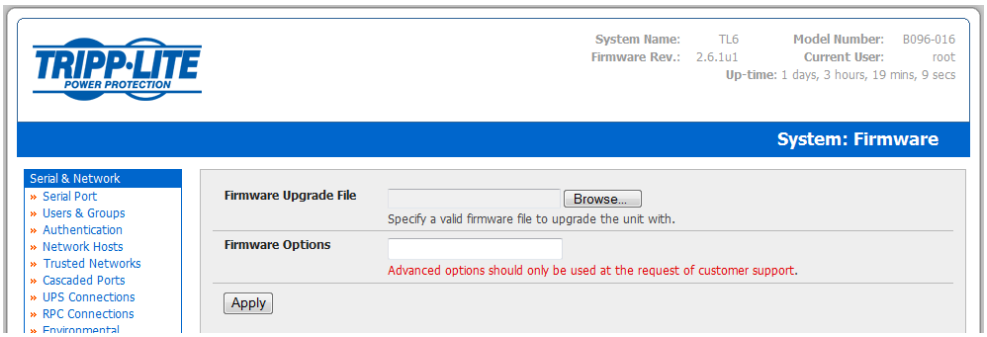
11.2 Upgrade Firmware

Before upgrading, check if you are already running the most current firmware in your Console Server. Your Console Server will not allow you to upgrade to the same or an earlier version.

- The Firmware version is displayed in the header of each page.



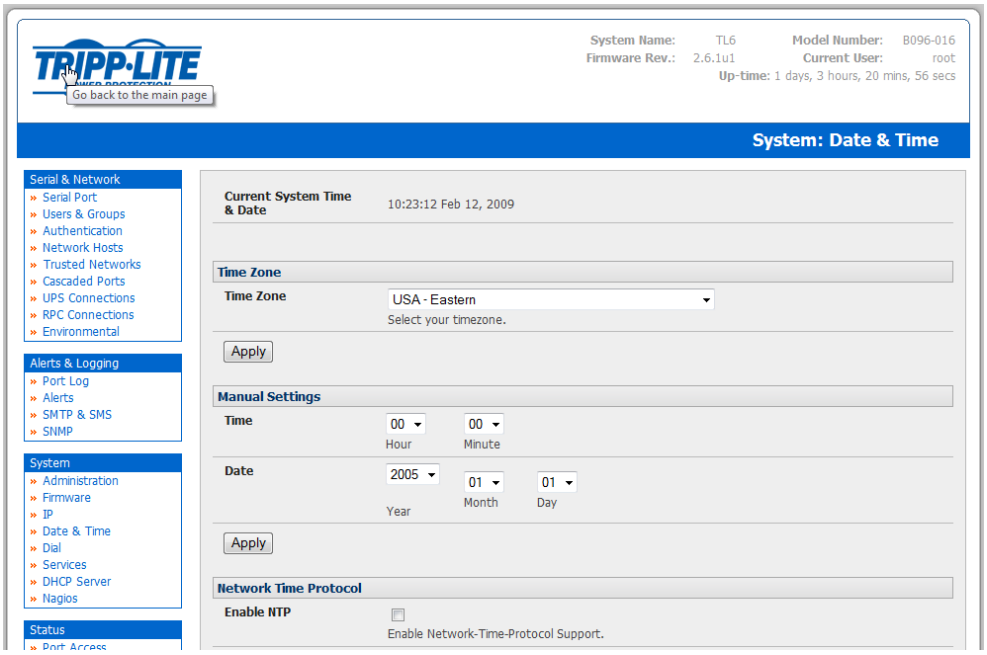
- Or select Status: Support Report and note the Firmware Version.
- To upgrade, you must first download the latest firmware image from http://www.tripplite.com/EN/support/downloads/driver-firmware-downloads.cfm
- Save this downloaded firmware image file on to a system on the same subnet as the Console Server.
- Also download and read the release_notes.txt for the latest information.
- To then upload the firmware image file to your Console Server, select System: Firmware.



- Specify the address and name of the downloaded Firmware Upgrade File, or Browse the local subnet and locate the downloaded file.
- Click Apply and the Console Server appliance will undertake a soft reboot and commence upgrading the firmware. This process will take several minutes.
- After the firmware upgrade has completed, click here to return to the Management Console. Your Console Server will have retained all its pre-upgrade configuration information.

11.3 Configure Date and Time

It is recommended that you set the local Date and Time in the Console Server as soon as it is configured. Features like Syslog and NFS logging use the system time for time-stamping log entries, while certificate generation depends on a correct Timestamp to check the validity period of the certificate.



- Select the System: Date & Time menu option.
- Manually set the Year, Month, Day, Hour and Minute using the Date and Time selection boxes, then click Apply.

The Console Server can synchronize its system time with a remote time server using the Network Time Protocol (NTP). Configuring with the NTP time server ensures that the Console Server clock will be accurate soon after the Internet connection is established. Also, if NTP is not used, the system clock will be reset randomly every time the Console Server is powered up. To set the system time using NTP:

- Select the Enable NTP checkbox on the Network Time Protocol page.
- Enter the IP address of the remote NTP Server and click Apply.

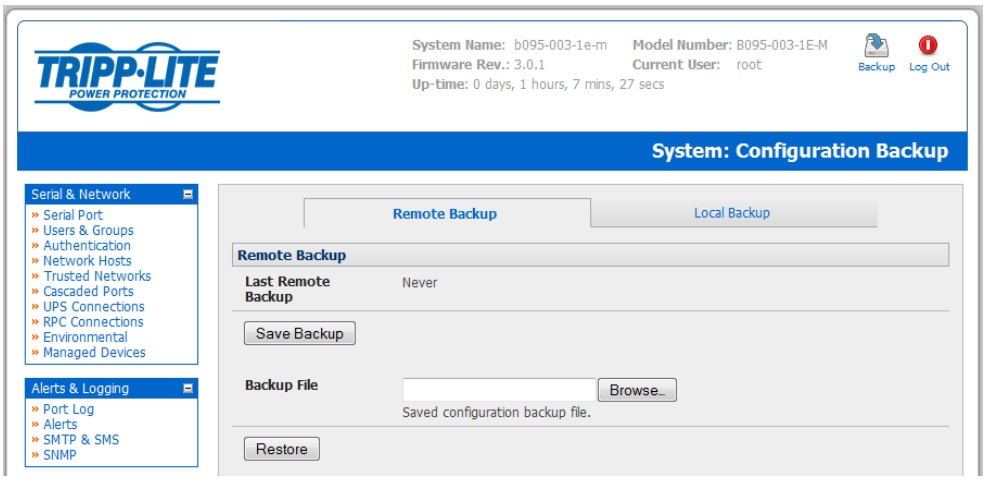
Specify your local time zone so the system clock can show local time (and not UTP):

- Set your appropriate region/locality in the Time Zone selection box and click Apply.

11.4 Configuration Backup (B095-004/003 only)

It is recommended that you back up the Console Server configuration whenever you make significant changes (such as adding new Users or Managed Devices) or before performing a firmware upgrade.

Note The configuration files can be backed up from the command line (refer *Chapter 14*). A new Back Up menu feature was introduced with Revision 3.0.1 firmware so is only currently available on B095-004-1E / B095-003-1E-M Console Servers.



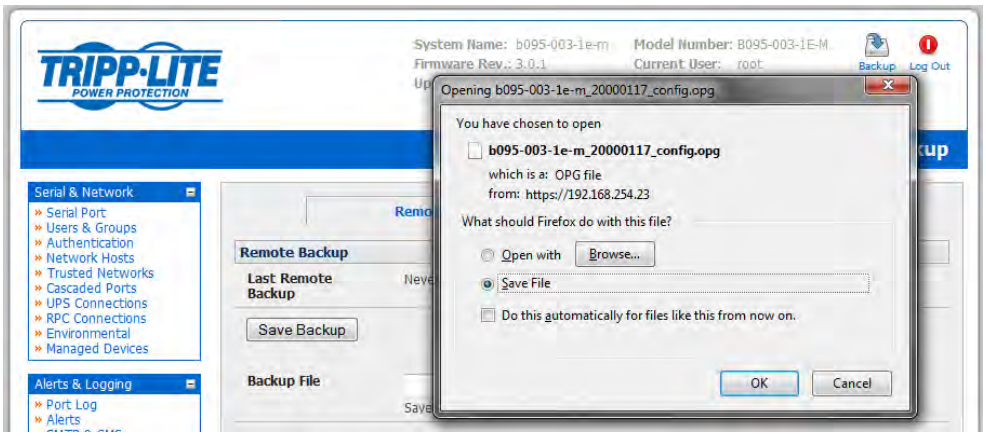
To activate the Back Up feature:

- Select the System: Configuration Backup menu option or click the

icon.

You can save the backup file remotely on your PC and you can restore configurations from remote locations:

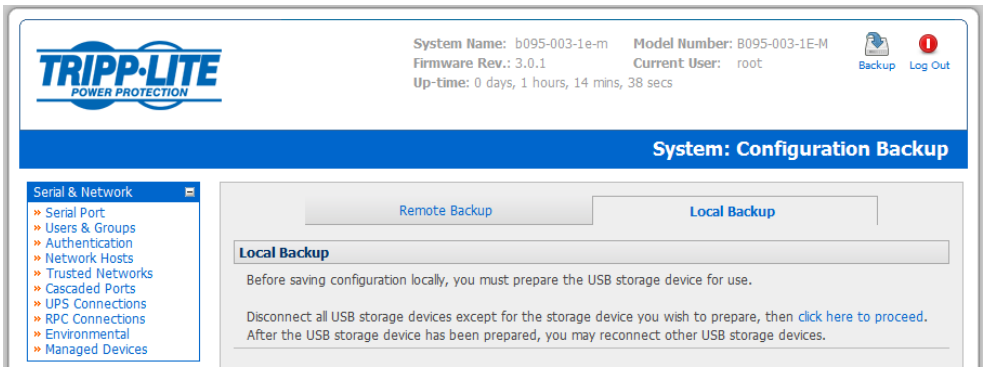
- Click Save Backup in the Remote Configuration Backup menu.
- The config backup file (System Name_date_config.opg) will be downloaded to your PC and saved in the location you nominate.



To restore a remote backup:

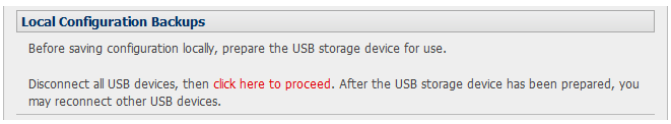
- Click Browse in the Remote Configuration Backup menu and select the Backup File you wish to restore.
- Click Restore and click OK. This will overwrite all the current configuration settings in your Console Server.

Alternately you can save the backup file locally onto the Console Server USB storage. To do this your Console Server must support USB and you must have an internal or external USB flash drive installed.


TRIPP·LITE
POWER PROTECTION
System Name: b095-003-1e-m
Model Number: B095-003-1E-M
Firmware Rev.: 3.0.1
Current User: root
Up-time: 0 days, 1 hours, 14 mins, 38 secs
Backup
Log Out
System: Configuration Backup
Serial & Network
» Serial Port
» Users & Groups
» Authentication
» Network Hosts
» Trusted Networks
» Cascaded Ports
» UPS Connections
» RPC Connections
» Environmental
» Managed Devices
Remote Backup
Local Backup
Local Backup
Before saving configuration locally, you must prepare the USB storage device for use.
Disconnect all USB storage devices except for the storage device you wish to prepare, then click here to proceed.
After the USB storage device has been prepared, you may reconnect other USB storage devices.

To backup and restore using USB:

- Ensure the USB flash is the only USB device attached to the Console Server and click Prepare Storage in the Local Configuration Backup menu:
- This will set a Volume Label on the USB storage device. This preparation step is only necessary the first time, and will not affect any other information you have saved onto the USB storage device. However it is recommended that you back up any critical data from the USB storage device before using it with your Console Server
- If there are multiple USB devices installed you will be warned to remove them:


Local Configuration Backups
Before saving configuration locally, prepare the USB storage device for use.
Disconnect all USB devices, then click here to proceed. After the USB storage device has been prepared, you may reconnect other USB devices.

- To backup to the USB enter a brief Description of the backup in the Local Configuration Backups menu and select Save Backup
- The Local Configuration Backup menu will display all the configuration backup files you have stored onto the USB flash
- To restore a backup from the USB simply, select Restore on the particular backup you wish to restore and click Apply

After saving a local configuration backup, you may choose to use it as the alternate default configuration. When the Console Server is reset to factory defaults, it will then load your alternate default configuration instead of its factory settings:

- To set an alternate default configuration, check Load On Erase and click Apply

---

Note: Before selecting *Load On Erase* please ensure you have tested your alternate default configuration by clicking Restore.

If for some reason your alternate default configuration causes the Console Server to become unbootable recover your unit to factory settings using the following steps:

- If the configuration is stored on an external USB storage device, unplug the storage device and reset to factory defaults as per section 11.1 of the owner's manual
- If the configuration is stored on an internal USB storage device, reset to factory defaults using a specially prepared USB storage device:
  - The USB storage device must be formatted with a Windows FAT32/VFAT file system on the first partition or the entire disk, most USB thumb drives are already formatted this way
  - The file system must have the volume label: OPG_DEFAULT
  - Insert this USB storage device into an external USB port on the Console Server and reset to factory defaults as per section 11.1

- After recovering your Console Server, ensure the problematic configuration is no longer selected for Load On Erase.

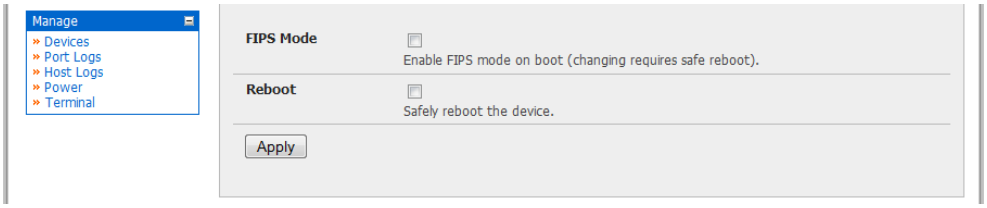
11.5 FIPS Mode (B095-004/003 only)

Note The US National Institute of Standards and Technology (NIST) publishes the FIPS (Federal Information Processing Standard) series of standards. FIPS 140-1 and FIPS 140-2 are both technical standards and worldwide de-facto standards for the implementation of cryptographic modules. These standards and guidelines are issued by NIST for use government-wide. NIST develops FIPS when there are compelling Federal Government requirements such as for security and interoperability and there are no acceptable industry standards or solutions.

Console Servers with Revision 3.0.1 firmware (or later) use an embedded OpenSSL cryptographic module that has been validated to meet the FIPS 140-2 standards and has received Certificate #1051. This firmware is only currently available on B095-004-1E / B095-003-1E-M Console Servers.

When configured in FIPs mode, all SSH, HTTPS and SDTConnector access to all services on the Console Servers will use the embedded FIPS compliant cryptographic module. To connect you must also be using cryptographic algorithms that are FIPs approved in your browser or client or the connection will fail.

- Select the System: Administration menu option.
- Check FIPS Mode to enable FIPS mode on boot, and check Reboot to safely reboot the console server.



- Click Apply and the Console Server will now reboot. It will take several minutes to reconnect as secure communications with your browser are validated. When reconnected it will display "FIPs mode: Enabled" in the banner.

Note: To enable FIPS mode from the command line, login and run these commands:

config -s config.system.fips=on
touch /etc/config/FIPS
chmod 444 /etc/config/FIPS
flatfsd -b

The final command saves to flash and reboots the unit. The unit will take a few minutes to boot into FIPS mode. To disable FIPS mode:

config -d config.system.fips
rm /etc/config/FIPS
flatfsd –b

---

12. STATUS REPORTS

Introduction

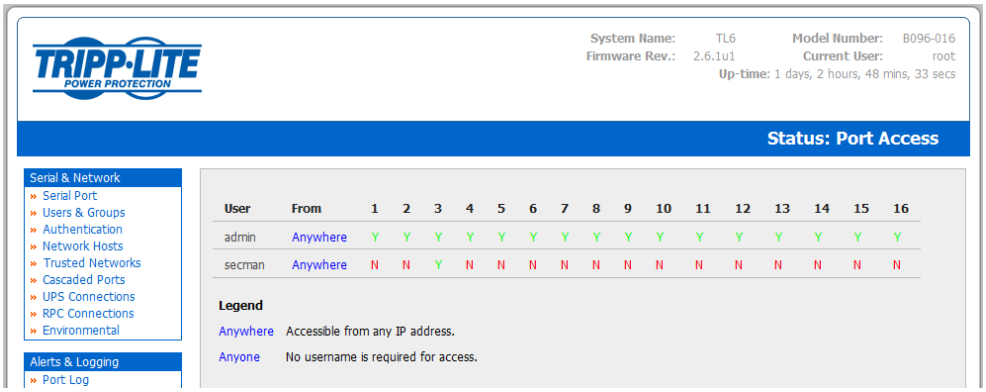
This chapter describes the selection of status reports that are available for review:

- Port Access and Active Users
- Statistics
- Support Reports
- Syslog
- UPS Status
- Dashboard

12.1 Port Access and Active Users

The Administrator can see which Users have access privileges to each serial port:

➢ Select the Status: Port Access.

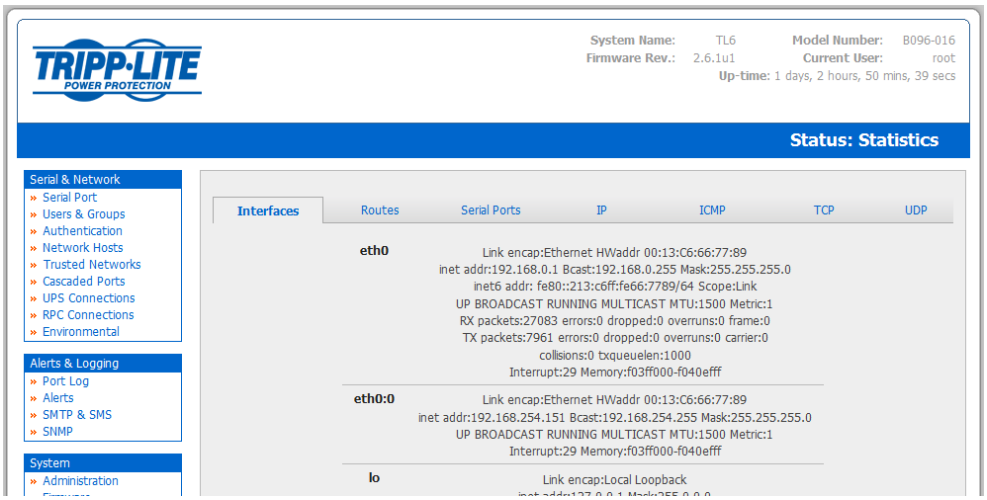

TRIPP·LITE
POWER PROTECTION
System Name: TL6
Model Number: B096-016
Firmware Rev.: 2.6.1u1
Current User: root
Up-time: 1 days, 2 hours, 48 mins, 33 secs
Status: Port Access
Serial & Network
» Serial Port
» Users & Groups
» Authentication
» Network Hosts
» Trusted Networks
» Cascaded Ports
» UPS Connections
» RPC Connections
» Environmental
Alerts & Logging
» Port Log
User From 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
admin Anywhere Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y
secman Anywhere N N Y N N N N N N N N N N N N N
Legend
Anywhere Accessible from any IP address.
Anyone No username is required for access.

The Administrator can also see the current status to identify which Users have an active session on each port:

- Select the Status: Active Users.

12.2 Statistics

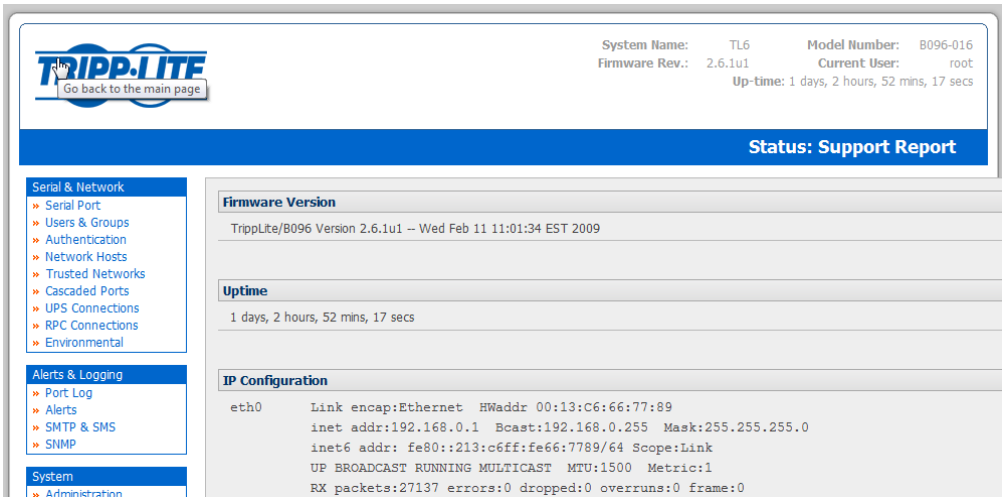
The Statistics report provides a snapshot of the data traffic and other activities and operations of your Console Server.



12.3 Support Reports

The Support Report provides useful status information that will assist the Tripp Lite technical support team to resolve any issues you may experience with your Console Server.

If you do experience an issue and have to contact Support, ensure you include the Support Report with your email support request. The Support Report should be generated when the issue is occurring, and attached in plain text format.



- Select the Status: Support Report menu option and you will be presented with a snapshot of your Console Server's status.
- Save the file as a text file and attach it to your support email.

12.4 Syslog

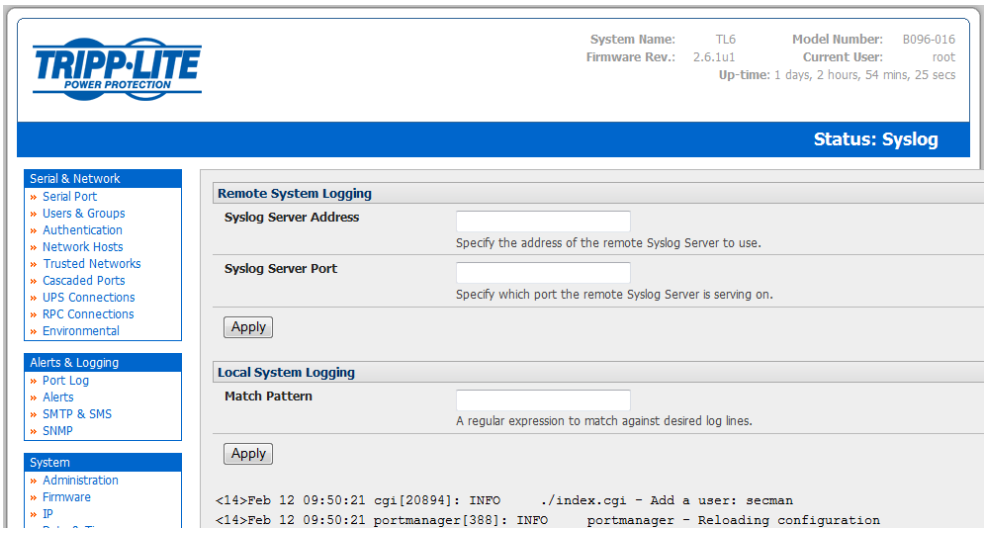
The Linux System Logger maintains a record of all system messages and errors:

- Select Status: Syslog.

Remote System Logging

The syslog record can be redirected to a remote Syslog Server:

- Enter the remote Syslog Server address and port details and then click Apply.



Local System Logging

To view the local Syslog file:

- Select Alerts & Logging: Syslog.

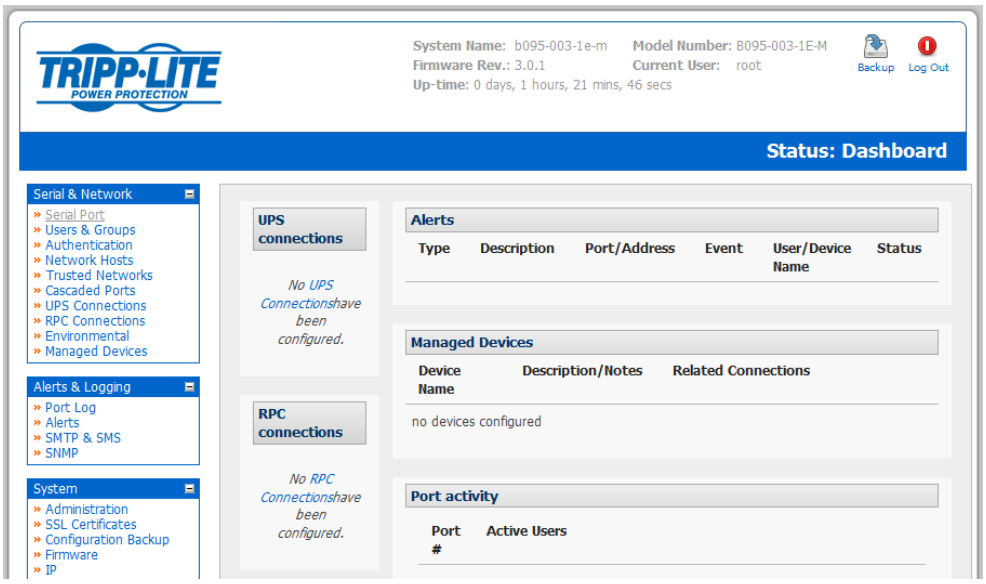
To make it easier to find information in the local Syslog file, a pattern matching filter tool is provided.

- Specify the Match Pattern that is to be searched for (e.g. the search for Mount is shown below) and click Apply. The Syslog will then be represented with only those entries that actually include the specified pattern.

12.5 Dashboard

The Dashboard provides the administrator with a summary of the status of the Console Server and its Managed Devices. Custom dashboards can be configured for each user groups.

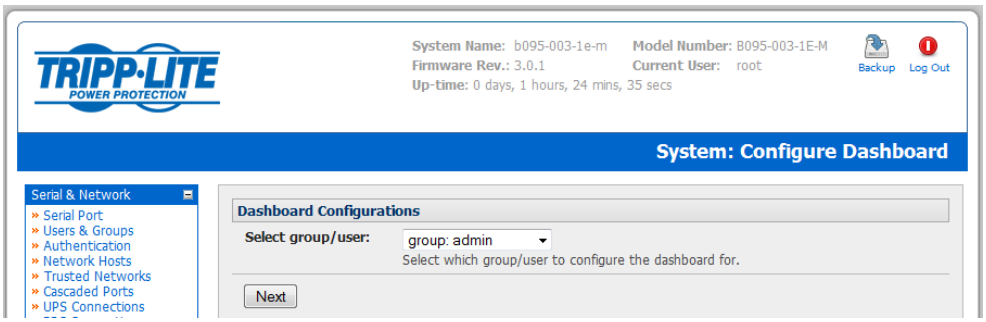
Note The Dashboard feature was introduced with Revision 3.0.1 firmware so is only currently available on B095-004-1E / B095-003-1E-M Console Servers.



12.5.1 Configuring the Dashboard

Only users who are members of the admin group (and the root user) can configure and access the dashboard. To configure a custom dashboard:

- Select System: Configure Dashboard and select the user (or group) you are configuring this custom dashboard layout for.



Note: You can configure a custom dashboard for any *admin* user or for the *admin* group or you can reconfigure the default dashboard.

The *Status:Dashboard* screen is the first screen displayed when *admin* users (other than *root*) log into the Console Server. If you log in as "*John*", and John is a member of the *admin* group and there is a dashboard layout configured for John, then you will see the dashboard for John (on log-in) and each time you click on the *Status:Dashboard* menu item.

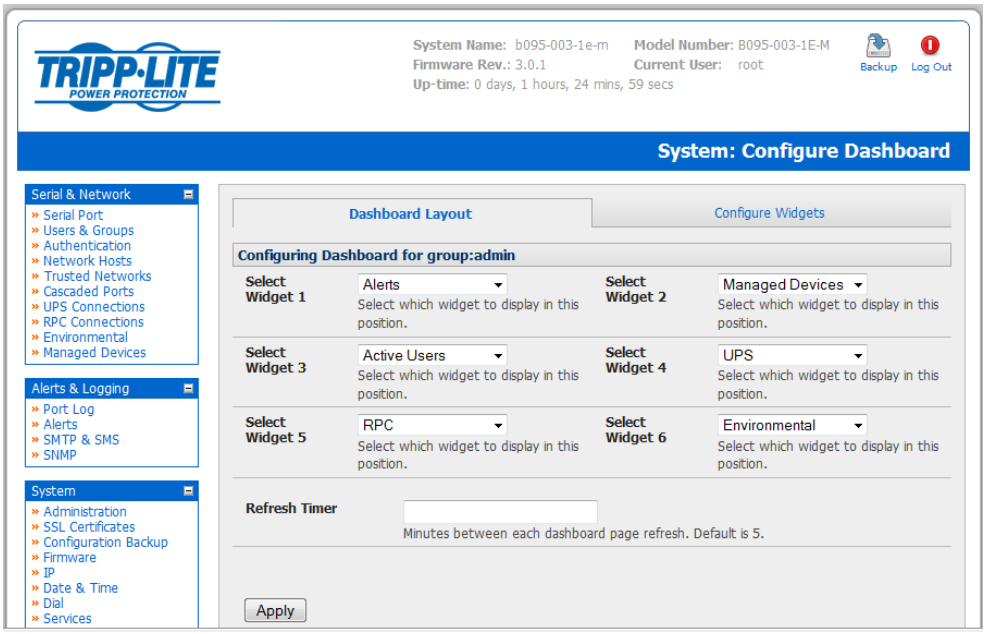
If there is no dashboard layout configured for John but there is an *admin* group dashboard configured then you will see the admin group dashboard instead. If there is no user dashboard or admin group dashboard configured, then you will see the default dashboard.

The *root* user does not have its own dashboard.

The above configuration options are intended to enable admin users to setup their own custom dashboards.

The Dashboard displays six widgets. These widgets include each of the Status screens (alerts, devices, ports, UPS, RPC and environmental status) and a custom script screen. The admin user can configure which of these widget is to be displayed where:

- Go to the Dashboard layout panel and select which widget is to be displayed in each of the six display locations (widget1 …6)
- Click Apply



Note: The Alerts widget is a new screen that shows the current alerts status. When an alert gets triggered, a corresponding .XML file is created in */var/run/alerts/.* The dashboard scans all these files and displays a summary status in the alerts widget. When an alert is deleted, the corresponding .XML files that belong to that alert are also deleted.

To configure what is to be displayed by each widget:

- Go to the Configure widgets panel and configure each selected widget (e.g. specify which UPS status is to be displayed on the UPS widget or the maximum number of Managed Devices to be displayed in the devices widget
- Click Apply

Note: Dashboard configuration is stored in the /etc/config/config.xml file. Each configured dashboard will increase the config file. If this file gets too big, you can run out of memory space on the Console Server.

12.5.2 Creating Custom Widgets for the Dashboard

To run a custom script inside a dashboard widget:

Create a file called "widget-<name>.sh" in the folder /etc/config/scripts/ where <name> can be anything. You can have as many custom dashboard files as you want.

Inside this file you can put any code you wish. When configuring the dashboard, choose "widget-<name>.sh" in the dropdown list. The dashboard will run the script and display the output of the script commands directly on the screen, inside the specific widget.

The best way to format the output would be to send HTML commands back to the browser by adding echo commands in the script:

echo '<table>'

You can, of course, run any command and its output will be displayed in the widget window directly. Below is a sample script which writes the current date to a file, and then echoes HTML code back to the browser. The HTML code gets an image from a specific URL and displays it in the widget.

```
#!/bin/sh

date >> /tmp/test
echo '<table>'
echo '<tr><td> This is my custom script running </td></tr>'
echo '<tr><td>'
echo '<img src="http://www.vinras.com/images/linux-online-inc.jpg">'
echo '</td></tr>'
echo '</table>'

exit 0
```

13. MANAGEMENT

Introduction

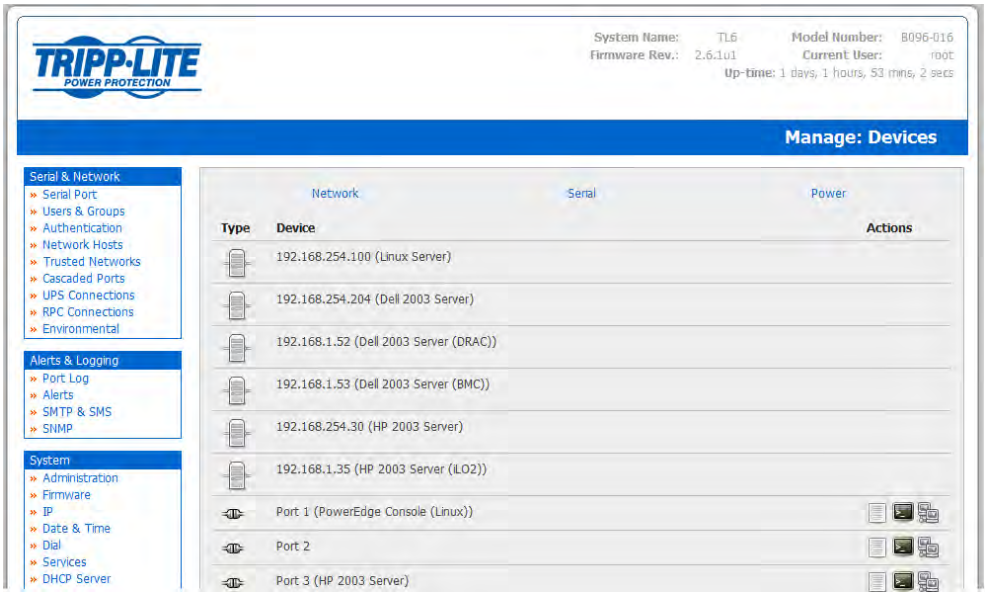
The Console Server Management Console has a number of reports and tools that can be accessed by both Administrators and Users:

- Access and control configured devices
- View serial port logs and host logs
- Use SDT Connector or the java terminal to access serially attached consoles
- Power control

13.1 Device Management

To display all the connected Serial devices, Network Hosts and Power devices:

➢ Select Manage: Devices. By selecting the Serial/ Network/ Power item, the display will be reduced to only those devices.

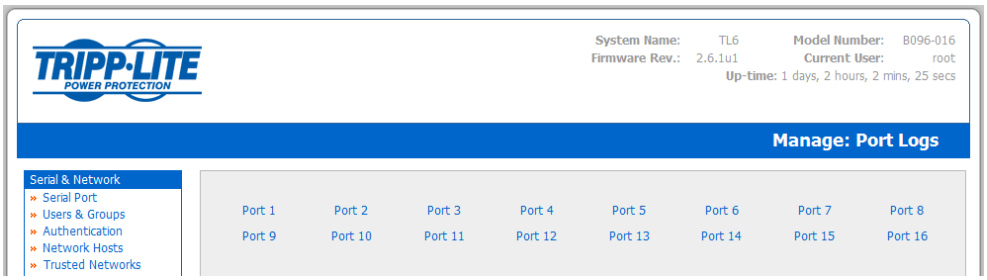


The user can take a range of actions on each of these Serial/Network/Power devices by selecting the Action icon or the related Manage menu item. Selecting the Manager Power icon or the Manage: Power menu is covered in Chapter 8.

13.2 Port & Host Management

Administrator and Users can view logs of data transfers to connected devices.

➢ Select Manage: Port Logs and the serial Port # to be displayed.


TRIPP·LITE
POWER PROTECTION
System Name: TL6
Firmware Rev.: 2.6.1u1
Model Number: B096-016
Current User: root
Up-time: 1 days, 2 hours, 2 mins, 25 secs
Manage: Port Logs
Serial & Network
» Serial Port
» Users & Groups
» Authentication
» Network Hosts
» Trusted Networks
Port 1 Port 2 Port 3 Port 4 Port 5 Port 6 Port 7 Port 8
Port 9 Port 10 Port 11 Port 12 Port 13 Port 14 Port 15 Port 16

➢ To display Host logs select Manage: Host Logs and the Host to be displayed.

13.3 Power Management

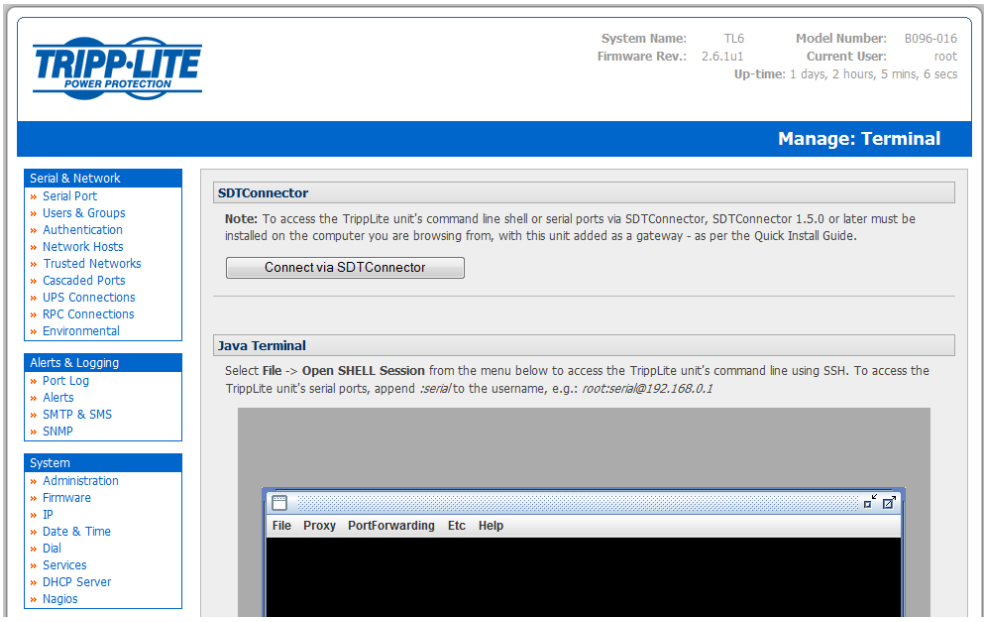
Administrator and Users can access and manage the connected power devices.

➢ Select Manage: Power.

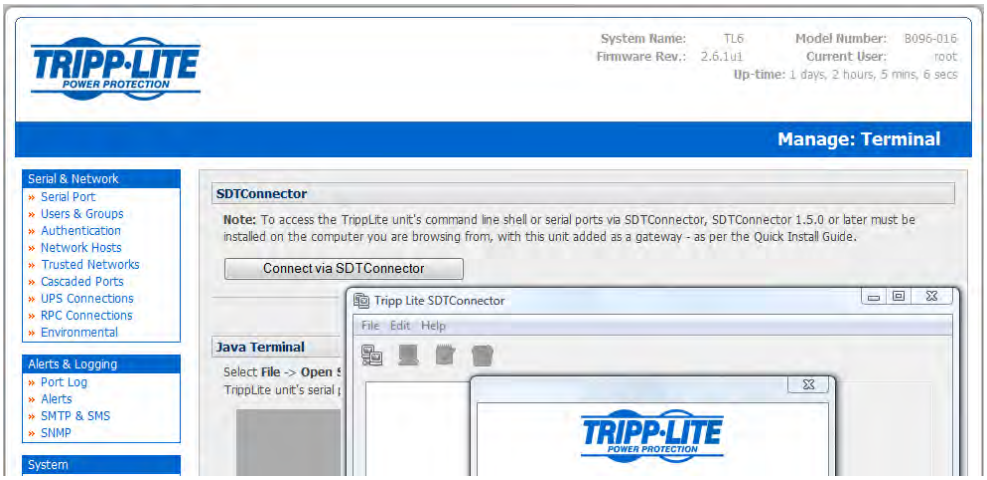
13.4 Serial Port Terminal Connection

Administrator and Users can communicate directly with the Console Server command line and with devices attached to the Console Server serial ports using SDT Connector and their local Telnet client, or using a java terminal in their browser.

➢ Select Manage: Terminal.


System Name: TL6
Model Number: B096-016
Firmware Rev.: 2.6.1u1
Current User: root
Up-time: 1 days, 2 hours, 5 mins, 6 secs
Manage: Terminal
Serial & Network
» Serial Port
» Users & Groups
» Authentication
» Network Hosts
» Trusted Networks
» Cascaded Ports
» UPS Connections
» RPC Connections
» Environmental
Alerts & Logging
» Port Log
» Alerts
» SMTP & SMS
» SNMP
System
» Administration
» Firmware
» IP
» Date & Time
» Dial
» Services
» DHCP Server
» Nagios
SDTConnector
Note: To access the TrippLite unit's command line shell or serial ports via SDTConnector, SDTConnector 1.5.0 or later must be installed on the computer you are browsing from, with this unit added as a gateway - as per the Quick Install Guide.
Connect via SDTConnector
Java Terminal
Select File -> Open SHELL Session from the menu below to access the TrippLite unit's command line using SSH. To access the TrippLite unit's serial ports, append :serial/to the username, e.g.: root:serial@192.168.0.1
File Proxy PortForwarding Etc Help

- Click Connect to SDT Connector to access the Console Server command line shell or the serial ports via SDT Connector. This will activate the SDT Connector client on the computer you are browsing and load your local Telnet client to connect to the command line or serial port using SSH.

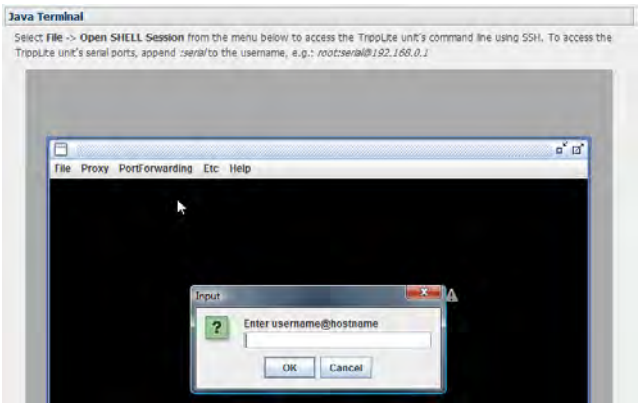

System Name: TL6
Model Number: B096-016
Firmware Rev.: 2.6.1u1
Current User: root
Up-time: 1 days, 2 hours, 5 mins, 6 secs
Manage: Terminal
Serial & Network
» Serial Port
» Users & Groups
» Authentication
» Network Hosts
» Trusted Networks
» Cascaded Ports
» UPS Connections
» RPC Connections
» Environmental
Alerts & Logging
» Port Log
» Alerts
» SMTP & SMS
» SNMP
System
SDTConnector
Note: To access the TrippLite unit's command line shell or serial ports via SDTConnector, SDTConnector 1.5.0 or later must be installed on the computer you are browsing from, with this unit added as a gateway - as per the Quick Install Guide.
Connect via SDTConnector
Java Terminal
Tripp Lite SDTConnector
File Edit Help

Note Tripp Lite SDT Connector must be installed on the computer from which you are browsing and the Console Server must be added as a gateway, as detailed in Chapter 6.

The alternative to using SDT Connector and your local Telnet client is to download the open source jcterm java terminal applet into your browser in order to connect to the Console Server and attached serial port devices. However jcterm does have some JRE compatibility issues which may prevent it from loading.

- Select Manage: Terminal. The jcterm java applet is downloaded from the Console Server to your browser and the virtual terminal will be displayed.
- Select File -> Open SHELL Session from the jcterm menu to access the command line using SSH.

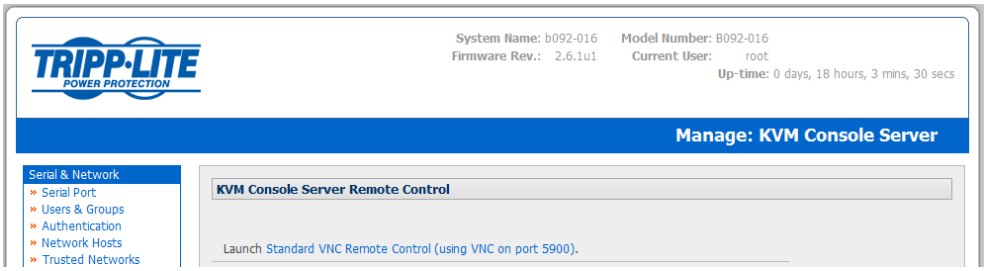
- To access the Console Server command line, enter the gateway's TCP address (e.g. 192.168.254.198) as hostname and the Username (e.g. root@192.168.254.198). Then enter the Password.
- To access the Console Server's serial ports, append :serial to the username. For example, with the gateway's TCP address of 192.168.254.198, and the Username of root, enter root:serial@192.168.254.198. Then enter Password and select the TCP Port address for the serial port to be accessed. By default 3001 is selected (i.e. Port 1). To access Port 4, this must be changed to 3004 for the Username.


Java Terminal
Select File -> Open SHELL Session from the menu below to access the TrippLite unit's command line using SSH. To access the TrippLite unit's serial ports, append :serial to the username, e.g.: root:serial@192.168.0.1
File Proxy PortForwarding Etc Help
Input
Enter username@hostname
OK
Cancel

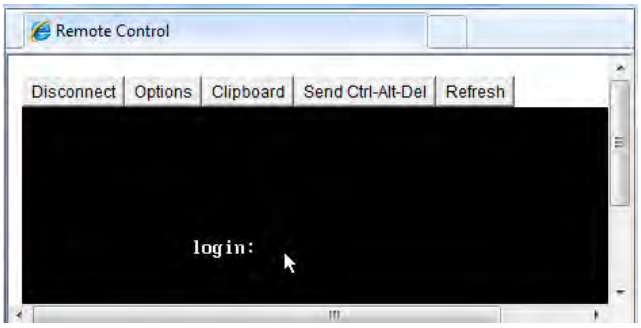
13.5 Remote Console Access (B092-016 only)

Administrator and Users can also connect to the B092-016 Console Server with PowerAlert remotely (as if they were plugged in locally to the KVM connectors on the B092-016). This connection will enable the remote users to run the PowerAlert software and the other thin client programs (refer to Chapter 16) embedded in the Console Server:

- Select Manage: KVM Console Server.



- Click Standard VNC Remote control and a VNC Java applet will be loaded into your browser to connect to the B092-016 Console Server. Then log in to the VNC applet and the Console Server (refer to Chapter 16.3 for more details).


Remote Control
Disconnect
Options
Clipboard
Send Ctrl-Alt-Del
Refresh
login:

14. BASIC CONFIGURATION - LINUX COMMANDS

Introduction

For those who prefer to configure their Console Server at the Linux command line level (rather than use a browser and the Management Console), this chapter describes how to get command line access and use the config tool to manage the system and configure the ports, etc. from the command line:

- Administration Configuration (System Settings and Authentication Configuration)
- Date and Time Configuration (Manually Change Clock Settings and Network Time Protocol Time Zone)
- Network Configuration (Static and DHCP IP Configuration, Dial-in Configuration and Services Configuration)
- Serial Port Configuration (Serial Port Settings, Supported Protocol Configuration, Users and Trusted Networks)
- Event Logging Configuration (Remote Serial Port Log Storage and Alert Configuration)

The config documentation in this chapter walks through the basic configuration (similar to what can be done with the Management Console). For advanced and custom configurations using other standard commands, refer to the next chapter, Advanced Configuration.

Since the Console Server runs a standard Linux kernel, it is also possible to configure it using other standard Linux and Busybox commands and applications as described in the last section of this chapter. However, doing this will not always guarantee these changes are permanent.

This chapter is not intended to teach you Linux. We assume you already have a certain level of understanding before you execute Linux kernel-level commands.

14.1 The Linux Command Line

- Power up the Console Server and connect the “terminal” device:
  - If you are connecting using the serial line, plug a serial cable between the Console Server local DB-9 port and terminal device. Configure the serial connection of the “terminal” device/program you are using to 115200bps, 8 data bits, no parity and one stop bit. If you are using a program running on a Windows computer as the terminal device, then the cable is made up from a Cat5 UTP cable and two DB-9 to RJ-45 adapters
  - If you are connecting over the LAN, you will need to interconnect the Ethernet ports and direct your terminal emulator program to the IP address of the Console Server (192.168.0.1 by default)
- Log on to the Console Server by pressing ‘return’ a few times. The Console Server will request a username and password. Enter the username root and the password default. You should now see the command line prompt which is a hash (#).

The config Tool

Syntax

config [-ahv] [-d id] [-g id] [-p path] [-r configurator] [-s id=value]

Description

The config tool allows manipulation and querying of the system configuration from the command line. Using config, the new configuration can be activated by running the relevant configurator which performs the action necessary to make the configuration changes live.

Configuration elements which can be changed are specified by a unique '.' separated name. For example, the configuration file version is identified as 'config.version'.

The config tool is designed to perform multiple actions from one command if needed, so if necessary, options can be chained together.

Options

-a –run-all	Run all registered configurators. This performs every configuration synchronization action pushing all changes to the live system.
-h –help	Display a brief usage message.
-v –verbose	Log extra debug information.
-d –del=id	Remove the given configuration element specified by a '.' separated identifier.
-g –get=id	Display the value of a configuration element.
-p –path=file	Specify an alternate configuration file to use. The default file is located at /etc/config/config.xml
-r –run=configurator	Run the specified registered configurator. Registered configurators are listed below.
-s --set=id=value	Change the value of configuration element specified by a '.' separated identifier.
-e --export=file	Save active configuration to file.
-i --import=file	Load configuration from file.
-t --test-import=file	Pretend to load configuration from file.
-S --separator=char	The pattern to separate fields with, default is '.'.

The registered configurators are:

alerts	ipconfig
auth	nagios
cascade	power
console	serialconfig
dhcp	services
dialin	Slave
eventlog	systemsettings
hosts	time
ipaccess	ups
	users

14.2 Administration Configuration

14.2.1 System Settings

To change system settings to the following values:

System Name	og.mydomain.com
System Password (root account)	secret
System SMTP Server	192.168.0.124
System SMTP Sender	og@mydomain.com

The following commands must be issued:

/bin/config –-set=config.system.name=og.mydomain.com

/bin/config –-set=config.system.password= #secret

/bin/config –-set=config.system.smtp.server=192.168.0.124

/bin/config –-set=config.system.smtp.sender=og@mydomain.com

The following command will synchronize the live system with the new configuration:

/bin/config –-run=systemsettings

The Console Server does not store user passwords in plain text so when manually setting the passwords using config -set you need to hash the “secret” and enter the hashed password (#secret). (One easy way to generate a hashed password is to run perl -e 'print crypt("", "")' on a Perl enabled box).

14.2.2 Authentication Configuration

You can configure the system remote authentication with the following settings:

Remote Authentication Method	LDAP
Server IP Address	192.168.0.32
Server Password	Secret
LDAP Base Node	Some base node

By issuing the following commands:

/bin/config –-set=config.auth.type=LDAP

```
# /bin/config –-set=config.auth.server=192.168.0.32
# /bin/config –-set=config.auth.password=Secret
# /bin/config –-set=”config.auth.ldap.basenode=some base node”
```

The following command will synchronize the live system with the new configuration:

```
# /bin/config –-run=auth
```

14.3 Date and Time Configuration

Manually Change Clock Settings

To change the running system time, you need to issue the following commands:

```
#  date 092216452005.05          Format is MMDDhhmm[[CC]YY][.ss]
```

Then the following command will save this new system time to the hardware clock:

```
# /bin/hwclock –systohc
```

Alternately, to change the hardware clock time, you need to issue the following commands:

```
# /bin/hwclock --set --date=092216452005.05
```

Where the format is MMDDhhmm[[CC]YY][.ss]

Then the following command will save this new hardware clock time as the system time:

```
# /bin/hwclock –hctosys
```

Network Time Protocol

To enable NTP using a server at pool.ntp.org, issue the following commands:

```
# /bin/config –-set=config.ntp.enabled=on
# /bin/config –-set=config.ntp.server=pool.ntp.org
```

The following command will synchronize the live system with the new configuration:

```
# /bin/config –-run=time
```

Time Zone

To change the system time zone USA to Eastern Standard Time, you need to issue the following commands:

```
# /bin/config –-set=config.system.timezone=US/Eastern
```

The following command will synchronize the live system with the new configuration:

```
# /bin/config –-run=time
```

14.4 Network Configuration

14.4.1 IP Configuration

Please note that supported interface modes are 'dhcp' and 'static':

DHCP

To enable a DHCP client on the primary Network interface (eth0) from the Console Server command line:

```
# /bin/config --set=config.interfaces.wan.mode=dhcp
```

The following command will then synchronize the live system with the new configuration:

```
# /bin/config –-run=ipconfig
```

Note: “/bin/config” commands can be combined into one command, for convenience.

Please note that supported interface modes are 'dhcp' and 'static'.

Static

To set static configuration on the primary Network interface with the following attributes:

IP Address:	192.168.1.100
Network Mask:	255.255.255.0
Default Gateway:	192.168.1.1

IP Address:	192.168.1.100
Primary DNS:	192.168.1.254
Secondary DNS:	10.1.0.254

You would need to issue the following commands from the command line:

```
# /bin/config --set=config.interfaces.wan.mode=static
# /bin/config --set=config.interfaces.wan.address=192.168.1.100
# /bin/config --set=config.interfaces.wan.netmask=255.255.255.0
# /bin/config --set=config.interfaces.wan.gateway=192.168.1.1
# /bin/config --set=config.interfaces.wan.dns1=192.168.1.254
# /bin/config --set=config.interfaces.wan.dns2=10.1.0.254
```

The following command will synchronize the live system with the new configuration:

```
# /bin/config –-run=ipconfig
```

14.4.2 Dial-In Configuration

To enable dial-in access on the DB9 serial port from the command line with the following attributes:

Local IP Address	172.24.1.1
Remote IP Address	172.24.1.2
Authentication Type:	MSCHAPv2
Serial Port Baud Rate:	115200
Serial Port Flow Control:	Hardware
Custom Modem Initialization:	ATQ0V1H0

You would need to issue the following commands from the command line to set system configuration:

```
# /bin/config –-set=config.console.ppp.localip=172.24.1.1
# /bin/config –-set=config.console.ppp.remoteip=172.24.1.2
# /bin/config –-set=config.console.ppp.auth=MSCHAPv2
# /bin/config –-set=config.console.ppp.enabled=on
# /bin/config –-set=config.console.speed=115200
```

```
# /bin/config –-set=config.console.flow=Hardware
# /bin/config –-set=config.console.initstring=ATQ0V1H0
```

The following command will synchronize the live system with the new configuration:

```
# /bin/config –-run=dialin
```

Please note that supported authentication types are 'None', 'PAP', 'CHAP' and 'MSCHAPv2'.

Supported serial port baud-rates are '9600', '19200', '38400', '57600', '115200', and '230400'.

Supported parity values are 'None', 'Odd', 'Even', 'Mark' and 'Space'.

Supported data-bits values are '8', '7', '6' and '5'.

Supported stop-bits values are '1', '1.5' and '2'.

Supported flow-control values are 'Hardware', 'Software' and 'None'.

If you do not wish to use out-of-band dial-in access, please note that the procedure for enabling start-up messages on the console port is covered in Chapter 15: Accessing the Console Port.

14.4.3 Services Configuration

You can manually enable or disable network servers from the command line. For example, if you wanted to guarantee the following server configuration:

HTTP Server	Enabled
HTTPS Server	Disabled
Telnet Server	Disabled
SSH Server	Enabled
SNMP Server	Disabled
Ping Replies (Respond to ICMP echo requests)	Disabled

You would need to issue the following commands from the command line to set system configuration:

```
# /bin/config –-set=config.services.http.enabled=on
# /bin/config –-del=config.services.https.enabled
# /bin/config –-del=config.services.Telnet.enabled
# /bin/config –-set=config.services.ssh.enabled=on
# /bin/config –-del=config.services.snmp.enabled
```

```
# /bin/config –-del=config.services.pingreply.enabled
```

The following command will synchronize the live system with the new configuration:

```
# /bin/config –-run=services
```

Note: “/bin/config” commands can be combined into one command for convenience.

14.5 Serial Port Configuration

14.5.1 Serial Port Settings

Setup serial port 5 to use the following properties:

Baud Rate	115200
Parity	None
Data Bits	8
Stop Bits	1
Flow Control	Software

You would need to issue the following commands from the command line to set the port configuration:

```
# /bin/config –-set=config.ports.port5.speed=115200
# /bin/config –-set=config.ports.port5.parity=None
# /bin/config –-set=config.ports.port5.charsize=8
# /bin/config –-set=config.ports.port5.stop=1
# /bin/config –-set=config.ports.port5.flow=Software
```

The following command will synchronize the live system with the new configuration:

```
# /bin/config –-run=serialconfig
```

Note that supported serial port baud-rates are ‘50’, ‘75’, ‘110’, ‘134’, ‘150’, ‘200’, ‘300’, ‘600’, ‘1200’, ‘1800’, ‘2400’, ‘4800’, ‘9600’, '19200', '38400', '57600', '115200', and '230400'.

Supported parity values are 'None', 'Odd', 'Even', 'Mark' and 'Space'.

Supported data-bits values are '8', '7', '6' and '5'.

Supported stop-bits values are '1', '1.5' and '2'.

Supported flow-control values are 'Hardware', 'Software' and 'None'.

14.5.2 Supported Protocol Configuration

To ensure remote access to serial port 5 is configured as follows:

Telnet Access LAN	Disabled
SSH Access LAN	Enabled
Raw TCP via LAN	Disabled

You would need to issue the following commands from the command line to set system configuration:

```
# /bin/config –-set=config.ports.port5.ssh=on
# /bin/config –-del=config.ports.port5.Telnet
# /bin/config –-del=config.ports.port5.tcp
```

The following command will synchronize the live system with the new configuration:

```
# /bin/config –-run=serialconfig
```

Note: "/bin/config" commands can be combined into one command for convenience.

14.5.3 Users

You can add a User to the system from the command line by performing the following instructions:

Determine the total number of existing Users. If you have no existing Users, you can assume this is 0.

```
# /bin/config –-get=config.users.total
```

This command should display:

config.users.total 1

Note that if you see:

config.users.total

This means you have 0 Users configured.

So your new User will be the existing total plus 1, so if the previous command gave you 0, then you start with user number 1. If you already have 1 user, your new user will be number 2, etc.

If you want a user named “user1” with a password of “secret” who will have access to serial port 5 from the network, you need to issue the these commands (assuming you have a previous user in place):

```
# /bin/config –-set=config.users.user2.username=user1
# /bin/config –-set=config.users.user2.password=secret
# /bin/config –-set=”config.users.user2.description=The Second User”
# /bin/config –-set=config.users.user2.port5=on
# /bin/config –-set=config.users.total=2
```

The following command will synchronize the live system with the new configuration:

```
# /bin/config –-run=users
```

14.5.4 Trusted Networks

You can further restrict remote access to serial ports based on the source IP address. To configure this via the command line, you need to do the following:

Determine the total number of existing trusted network rules. If you have no existing rules, you can assume this is 0.

```
# /bin/config –-get=config.portaccess.total
```

This command should display:

config.portaccess.total 1

Note that if you see:

config.portaccess.total

This means you have 0 rules configured.

Your new rule will be the existing total plus 1. So if the previous command gave you 0, then you start with rule number 1. If you already have 1 rule, your new rule will be number 2, etc.

If you want to restrict access to serial port 5 to computers from a single C class network 192.168.5.0, you need to issue the following commands (assuming you have a previous rule in place):

```
# /bin/config –-set=config.portaccess.rule2.address=192.168.5.0
# /bin/config –-set=config.portaccess.rule2.netmask=255.255.255.0
# /bin/config –-set=”config.portaccess.rule2.description=foo bar.”
# /bin/config –-set=config.portaccess.rule2.port5=on
```

```
# /bin/config –-set=config.portaccess.total=2
```

Please note that this rule becomes live straight away.

14.6 Event Logging Configuration

14.6.1 Remote Serial Port Log Storage

To setup remote storage of serial port 5 log to a remote Windows share with the following properties:

IP Address	192.168.0.254
Directory	C:\\tripplite\logs\
Username	cifs_user
Password	secret
Logging level	2 (input/output logging as well as user connections & disconnections)

The following commands must be issued:

```
# /bin/config –-set=config.eventlog.server.type=cifs
# /bin/config –-set=config.eventlog.server.address=192.168.0.254
# /bin/config –-set=config.eventlog.server.path=/tripplite/logs
# /bin/config –-set=config.eventlog.server.username=cifs_user
# /bin/config –-set=config.eventlog.server.password=secret
# /bin/config –-set=config.ports.port5.loglevel=2
```

The following command will synchronize the live system with the new configuration:

```
# /bin/config –-run=eventlog
```

Note that supported remote storage server types are 'None', 'cifs', 'nfs' and 'syslog'.

Supported port logging levels are '0', '1' and '2'.

14.6.2 Alert Configuration

You can add an email alert to the system from the command line by following these instructions:

Determine the total number of existing alerts (if you have no existing alerts) you can assume this is 0.

/bin/config –-get=config.alerts.total

This command should display output similar to:

config.alerts.total 1

Note that if you see:

config.alerts.total

This means you have 0 alerts configured.

Your new alert will be the existing total plus 1. So if the previous command gave you 0, then you start with user number 1. If you already have 1 alert, your new alert will be number 2, etc.

To configure an email alert to be sent to alert1@domain.org when the regular expression "Cpu.*0.0% id," matches logging on serial port 5, you would need to issue the following commands (Assuming you have 1 previous alert in place):

/bin/config –-set=config.alerts.alert2.email=alert1@domain.com

/bin/config –-set="config.alerts.alert2.pattern=.*0.0% id,"

/bin/config –-set=config.alerts.alert2.port5=on

/bin/config –-del=config.alerts.total=2

The following command will synchronize the live system with the new configuration:

/bin/config –-run=alerts

14.7 SDT Host Configuration

14.7.1 SDT Host TCP Ports

To setup the list of TCP ports for a host, you use the config command:

config -s config.sdt.hosts.host3.tcpports.tcport1 = 23

config -s config.sdt.hosts.host3.tcpports.tcport2 = 5900

config -s config.sdt.hosts.host3.tcpports.tcport3 = 3389

The above assumes the config below:

vi /etc/config/config.xml ~

</users>

```
      </host1>
      <total>3</total>
      <host2>
        <address>accounts.intranet.myco.com</address>
        <description>Accounts server</description>
        <users>
          <total>1</total>
          <user1>John</user1>
        </users>
      </host2>
      <host3>
        <address>192.168.254.191</address>
        <description>Tonys Win2000 Box</description>
        <users>
          <total>1</total>
          <user1>John</user1>
        </users>
        <tcpports><tcpport1>23</tcpport1></tcpports>
      </host3>
    </hosts>
  </sdt>
</config>
```

14.8 Configuration Backup and Restore

Before backing up the configuration, you need to arrange a way to transfer the backup off-box. This could be via an NFS share, a Samba (Windows) share to USB storage, or copied off-box via the network. If backing up directly to off-box storage, make sure it is mounted.

/tmp is not a good location for the backup except as a temporary location before transferring it off-box. The /tmp directory will not survive a reboot. The /etc/config directory is not a good place either, as it will not survive a restore.

Backup and restore should be done by the root user to ensure correct file permissions are set. The config command is used to create a backup tarball:

```
config -e <Output File>
```

The tarball will be saved to the indicated location. It will contain the contents of the /etc/config/ directory in an uncompressed and unencrypted form.

Example nfs storage:

```
# mount -t nfs 192.168.0.2:/backups /mnt # config -e /mnt/xxxxx.config # umount/mnt/
```

Example transfer off-box via scp:

```
# config -e /tmp/xxxxx.config
# scp /tmp/xxxxx.config 192.168.0.2:/backups
```

The config command is also used to restore a backup:

```
config -i <Input File>
```

This will extract the contents of the previously created backup to /tmp, and then synchronize the /etc/config directory with the copy in /tmp.

One possible problem that can occur here is that there is not enough room in /tmp to extract files to. The following command will temporarily increase the size of /tmp:

```
mount -t tmpfs -o remount,size=2048k tmpfs /var
```

If restoring to either a new unit or one that has been factory defaulted, it is important to make sure that the process generating SSH keys is either stopped or completed before restoring configuration. If this is not done, then a mix of old and new keys may be put in place.

As SSH uses these keys to avoid man-in-the-middle attacks, logging in may be disrupted.

14.9 General Linux Command Usage

The Console Server platform is a dedicated Linux computer, optimized to provide access to serial consoles of critical server systems and control network connected hosts. Being based around uClinux (a small footprint but extensible Linux), it embodies a myriad of popular and proven Linux software modules for networking (NetFilter, IPTables), secure access (OpenSSH) and communications (OpenSSL) and sophisticated user authentication (PAM, RADIUS, TACACS+ and LDAP).

Many components of the Console Server software are licensed under the GNU General Public License (version 2). You may obtain a copy of the GNU General Public License at http://www.fsf.org/copyleft/gpl.html and source code will provided for any of the components of the Software licensed under the GNU General Public License upon request. The Console Servers are built on the 2.4 uClinux kernel as developed by the uClinux project. This is where GPL code and source can be found: http://cvs.uclinux.org.

Supported commands that have config files that can be altered include:

portmanager	
inetd	
init	
ssh/sshd/scp/sshkeygen	
ucd-snmpd	http://www.ece.ucdavis.edu/ucd-snmp/
samba	
fnord (web server)	
sslwrap	

Commands you can run from the command line on the Console Server include:

loopback	
bash (shell)	
busybox	http://www.busybox.net/downloads/BusyBox.html (has lots of unix shell commands and tools)
chat	
dhcpcd	
ftp	
hd	
hwclock	
iproute	
iptables	
netcat	
ifconfig	
mii-tool	
netstat	
route	
openntpd	
ping	
portmap	
pppd	
routed	
setserial	

smtpclient
stty
stunel
tcpdump
tftp
tip
traceroute

More details on the above Linux commands can found online at:

http://en.tldp.org/HOWTO/HOWTO-INDEX/howtos.html

http://www.faqs.org/docs/Linux-HOWTO/Remote-Serial-Console-HOWTO.html

http://www.stokely.com/unix.serial.port.resources/serial.switch.html

15. ADVANCED CONFIGURATION

Introduction

This chapter documents the embedded portmanager application which manages the serial ports on the Console Server and gives examples of its use:

- portmanager documentation
- Scripts and alerts
- Raw data access to the ports and modems

This chapter also describes details how to perform advanced and custom management tasks using Linux commands and script:

- iptables modifications and updating IP Filtering rules
- Modifying SNMP with net-snmpd
- Public key authenticated SSH communications
- SSL, configuring HTTPS and issuing certificates
- Using the pmpower application and powerman for power device management
- Using IPMI tools

15.1 Advanced Portmanager

pmshell

The pmshell command acts similarly to the standard tip or cu commands, but all serial port access is directed via the portmanager.

Example:

To connect to port 8 via the portmanager:

pmshell -l port08

pmshell Commands:

Once connected, the pmshell command supports a subset of the '~' escape commands that tip/cu support. For SSH, you must prefix the escape with an additional '~' command (i.e. use the '~~' escape).

Send Break:

Typing the character sequence '~b' will generate a BREAK on the serial port.

History:

Typing the character sequence '~h' will generate a history on the serial port.

Quit pmshell:

Typing the character sequence '~.' will exit from pmshell.

Set RTS to 1 run the command:

pmshell --rts=1

Show all signals

pmshell –signals

DSR=1 DTR=1 CTS=1 RTS=1 DCD=0

Read a line of text from the serial port:

pmshell –getline

pmchat

The pmchat command acts similarly to the standard chat command, but all serial port access is directed via the portmanager.

Example:

To run a chat script via the portmanager:

```
# pmchat -v -f /etc/config/scripts/port08.chat < /dev/port08
```

For more information on using chat (and pmchat), you should consult the UNIX man pages:

http://techpubs.sgi.com/library/tpl/cgi-bin/getdoc.cgi?coll=linux&db=man&fname=/usr/share/catman/man8/chat.8.html

pmusers

The pmusers command is used to query the portmanager for active user sessions.

Example:

To detect which users are currently active on which serial ports:

```
# pmusers
```

This command will not output anything if there are no active users currently connected to any ports, otherwise, it will respond with a sorted list of usernames per active port:

```
Port 1:
        user1
        user2
Port 2:
        user1
Port 8:
        user2
```

The above output indicates that a user named “user1” is actively connected to ports 1 and 2, while “user2” is connected to both ports 1 and 8.

Portmanager Daemon

Command line options:

There is normally no need to stop and restart the daemon. To restart the daemon, just run the command:

```
# portmanager
```

Supported command line options are:

Force portmanager to run in the foreground:

```
--nodaemon
```

Set the level of debug logging:

```
--loglevel={debug,info,warn,error,alert}
```

Change which configuration file it uses:

```
-c /etc/config/portmanager.conf
```

Signals

Sending a SIGHUP signal to the portmanager will cause it to reread its configuration file.

15.2 External Scripts and Alerts

The portmanager has the ability to execute external scripts on certain events. These events are:

I. When a port is opened by the portmanager:

   When the portmanager opens a port, it attempts to execute /etc/config/scripts/portXX.init (where XX is the number of the port, e.g. 08). The script is run with STDIN and STDOUT both connected to the serial port.

   If the script cannot be executed, then portmanager will execute /etc/config/scripts/portXX.chat via the chat command on the serial port.

II. When an alert occurs on a port:

When an alert occurs on a port, the portmanager will attempt to execute /etc/config/scripts/portXX.alert (where XX is the port number, e.g. 08).

The script is run with STDIN containing the data which triggered the alert, and STDOUT redirected to /dev/null, NOT to the serial port. If you wish to communicate with the port, use pmshell or pmchat from within the script.

If the script cannot be executed, then the alert will be mailed to the address configured in the system administration section.

III. When a user connects to any port:

If a file called /etc/config/pmshell-start.sh exists, it is run when a user connects to a port. It is provided with 2 arguments, the "Port number" and the "Username". Here is a simple example:

</etc/config/pmshell-start.sh >

```
#!/bin/sh

PORT="$1"
USER="$2"

echo "Welcome to port $PORT $USER"
```

< /etc/config/pmshell-start.sh>

The return value from the script controls whether the user is accepted or not. If 0 is returned (or nothing is done on exit as in the above script), then the user is permitted, otherwise, the user is denied access.

Here is a more complex script which reads from configuration to display the port label if available and denies access to the root user:

</etc/config/pmshell-start.sh>

```
#!/bin/sh

PORT="$1"
USER="$2"
LABEL=$(config -g config.ports.port$PORT.label | cut -f2- -d' ')

if [ "$USER" == "root" ]; then
        echo "Permission denied for Super User"
        exit 1
```

```
fi

if [  -z  "$LABEL" ]; then
   echo "Welcome $USER, you are connected to Port $PORT"
else
   echo "Welcome $USER, you are connected to Port $PORT ($LABEL)"
fi
</etc/config/pmshell-start.sh>
```

15.3 Raw Access to Serial Ports

Access to Serial Ports

You can tip and stty to completely bypass the portmanager and have raw access to the serial ports.

When you run tip on a portmanager controlled port, portmanager closes that port, and stops monitoring it until tip releases control of it.

With stty, the changes made to the port only "stick" until that port is closed and opened again, so it is doubtful that people will want to use stty for more than initial debugging of the serial connection.

If you want to use stty to configure the port, you can put stty commands in /etc/config/scripts/portXX.init, which gets run whenever portmanager opens the port.

Otherwise, any setup you do with stty will get lost when the portmanager opens the port. The reason that portmanager sets things back to its config, rather than using whatever is on the port, is so the port is in a known good state, and will work, no matter what things are done to the serial port outside of portmanager.

Accessing the Console Port

The console dial-in is handled by mgetty, with automatic PPP login extensions. mgetty is a smart getty replacement, designed to be used with hayes compatible data and data/fax modems. mgetty knows about modem initialization, manual modem answering (so your modem doesn't answer if the machine isn't ready), UUCP locking (so you can use the same device for dial-in and dial-out). mgetty provides very extensive logging facilities. All standard mgetty options are supported.

- Modem initialization strings

To override the standard modem initialization string, either use the Management Console (refer to Chapter 5) or the command line config tool (refer to Dial-In Configuration Chapter 14).

- Enabling Boot Messages on the Console

  If you are not using a modem on the DB9 console port and instead wish to connect to it directly via a Null Modem cable, you may want to enable verbose mode, allowing you to see the standard linux start-up messages. This can be achieved with the following commands:

  # /bin/config --set=config.console.debug=on # /bin/config --run=console # reboot

  If at some point in the future you chose to connect a modem for dial-in out-of-band access, the procedure can be reversed with the following commands:

  # /bin/config --del=config.console.debug # /bin/config --run=console # reboot

15.4 IP- Filtering

Standard IP-Filter Configuration:

The system uses the iptables utility to provide a stateful firewall of LAN traffic. By default, rules are automatically inserted to allow access to enabled services, and serial port access via enabled protocols. The commands which add these rules are contained in configuration files.

/etc/config/ipfilter

This is an executable shell script which is run whenever the LAN interface is brought up and whenever modifications are made to the iptables configuration as a result of CGI actions or the config command line tool.

The basic steps performed are as follows:

a) The current iptables configuration is erased.

b) If a customized IP-Filter script exists, it is executed and no other actions are performed.

c) Standard policies are inserted which will drop all traffic not explicitly allowed to and through the system.

d) Rules are added which explicitly allow network traffic to access enabled services e.g. HTTP, SNMP etc.

e) Rules are added which explicitly allow traffic network traffic access to serial ports over enabled protocols e.g. Telnet, SSH and raw TCP.

Customizing the IP-Filter:

/etc/config/filter-custom

If the standard system firewall configuration is not adequate for your needs, it can be bypassed safely by creating a file at /etc/config/filter, custom- containing commands to build a specialized firewall. This firewall script will be run whenever the LAN interface is brought up (including initially) and will override any automated system firewall settings.

Below is a simple example of a custom script which creates a firewall using the iptables command. Only incoming connections from computers on a C-class network 192.168.10.0 will be accepted when this script is installed at /etc/config/filter-custom (Note that when this script is called, any preexisting chains and rules have been flushed from iptables):

```
#/bin/sh

# Set default policies to drop any incoming or routable traffic

# and blindly accept anything from the 192.168.10.0 network.

iptables –-policy FORWARD DROP

iptables –-policy INPUT DROP

iptables –-policy OUTPUT ACCEPT


# Allow responses to outbound connections back in.

iptables –-append INPUT \

        –-match state –-state ESTABLISHED,RELATED –-jump ACCEPT


# Explicitly accept any connections from computers on

# 192.168.10.0/24

iptables –-append INPUT –-source 192.168.10.0/24 –-jump ACCEPT
```

Good documentation about using the iptables command can be found at the linux netfilter website http://netfilter.org/documentation/index.html

Resources

There are many high-quality tutorials and HOWTOs available via the netfilter website; in particular, peruse the tutorials listed on the netfilter HOWTO page. A list of useful web locations has been compiled for your convenience below:

Netfilter Homepage	http://netfilter.org
Netfilter/iptables Tutorials	http://netfilter.org/documentation/index.html#documentation-tutorials

15.5 Modifying SNMP Configuration

/etc/config/snmpd.conf

The net-snmpd is an extensible SNMP agent which responds to SNMP queries for management information from SNMP management software. Upon receiving a request, it processes the request(s), collects the requested information and/or performs the requested operation(s) and returns the information to the sender.

This includes built-in support for a wide range of MIB information modules, and can be extended using dynamically loaded modules, external scripts and commands. Snmpd, when enabled, should run with a default configuration. Its behavior can be customized via the options in /etc/config/snmpd.conf.

Changing standard system information such as system contact, name and location can be achieved by editing /etc/config/snmpd.conf file and locating the following lines:

sysdescr	"tripplite"
syscontact	root <root@localhost>(configure /etc/default/snmpd.conf)
sysname	Not defined (edit /etc/default/snmpd.conf)
syslocation	Not defined (edit /etc/default/snmpd.conf)

Simply change the values of sysdescr, syscontact, sysname and syslocation to the desired settings and restart snmpd.

The snmpd.conf is extremely powerful and too flexible to cover completely here. The configuration file itself is commented extensively and good documentation is available at the net-snmp website http://www.net-snmp.org, specifically:

Man Page:	http://www.net-snmp.org/docs/man/snmpd.conf.html
FAQ:	http://www.net-snmp.org/docs/FAQ.html
Net-SNMPD Tutorial:	http://www.net-snmp.org/tutorial/tutorial-5/demon/snmpd.html

15.5.1 Adding More than One SNMP Server

To add more than one SNMP server for alert traps, add the first SNMP server using the Management Console (refer to Chapter 7) or the command line config tool. Secondary and any further SNMP servers are added manually using config.

Log in to the Console Server's command line shell as root or an admin user. Refer back to the Management Console UI or user documentation for descriptions of each field.

To set the Manager Protocol field:
  config --set config.system.snmp.protocol2=UDP or
  config --set config.system.snmp.protocol2=TCP

To set the Manager Address field:
  config --set config.system.snmp.address2=w.x.y.z
.. replacing w.x.y.z with the IP address or DNS name.

To set the Manager Trap Port field:
  config --set config.system.snmp.trapport2=162
.. replacing 162 with the TCP/UDP port number

To set the Version field:
  config --set config.system.snmp.version2=1 or
  config --set config.system.snmp.version2=2c or
  config --set config.system.snmp.version2=3

To set the Community field (SNMP version 1 and 2c only):
  config --set config.system.snmp.community2=yourcommunityname
.. replacing yourcommunityname with the community name

To set the Engine ID field (SNMP version 3 only):
  config --set config.system.snmp.engineid2=800000020109840301
.. replacing 800000020109840301 with the engine ID

To set the Username field (SNMP version 3 only):
  config --set config.system.snmp.username2=yourusername
.. replacing yourusername with the username
config.system.snmp.username2 (3 only)

To set the Engine ID field (SNMP version 3 only):
  config --set config.system.snmp.password2=yourpassword
.. replacing yourpassword with the password

Once the fields are set, apply the configuration with the following command:

config --run snmp

You can add a third or more SNMP servers by incrementing the "2" in the above commands, e.g. config.system.snmp.protocol3, config.system.snmp.address3, etc.

15.6 Secure Shell (SSH) Public Key Authentication

This section covers the generation of public and private keys in a Linux and Windows environment and configuring SSH for public key authentication. The steps to use in a Clustering environment are:

- Generate a new public and private key pair
- Upload the keys to the Master and to each Slave Console Server
- Fingerprint each connection to validate

15.6.1 SSH Overview

Popular TCP/IP applications such as Telnet, rlogin, ftp, and others transmit their passwords unencrypted. Doing this across public networks like the Internet can have catastrophic consequences. It leaves the door open for eavesdropping, connection hijacking, and other network-level attacks.

Secure Shell (SSH) is a program to log into another computer over a network, to execute commands in a remote machine, and to move files from one machine to another. It provides strong authentication and secure communications over unsecure channels.

OpenSSH, the de facto open source SSH application, encrypts all traffic (including passwords) to effectively eliminate these risks. Additionally, OpenSSH provides a myriad of secure tunneling capabilities, as well as a variety of authentication methods.

OpenSSH is the port of OpenBSD's excellent OpenSSH[0] to Linux and other versions of Unix. OpenSSH is based on the last free version of Tatu Ylonen's sample implementation with all patent-encumbered algorithms removed (to external libraries), all known security bugs fixed, new features reintroduced and many other clean-ups. http://www.openssh.com/ The only changes in the SSH implementation are:

- PAM support
- EGD[1]/PRNGD[2] support and replacements for OpenBSD library functions that are absent from other versions of UNIX
- The config files are now in /etc/config. e.g.
    - /etc/config/sshd_config instead of /etc/sshd_config
    - /etc/config/ssh_config instead of /etc/ssh_config
    - /etc/config/users/<username>/.ssh/ instead of /home/<username>/.ssh/

15.6.2 Generating Public Keys (Linux)

To generate new SSH key pairs, use the Linux ssh-keygen command. This will produce an RSA or DSA public/private key pair and you will be prompted for a path to store the two key files e.g. id_dsa.pub (the public key) and id_dsa (the private key). For example:

```
$ ssh-keygen -t [rsa|dsa]
Generating public/private [rsa|dsa] key pair.
Enter file in which to save the key (/home/user/.ssh/id_[rsa|dsa]):
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in /home/user/.ssh/id_[rsa|dsa].
Your public key has been saved in /home/user/.ssh/id_[rsa|dsa].pub.
The key fingerprint is:
28:aa:29:38:ba:40:f4:11:5e:3f:d4:fa:e5:36:14:d6 user@server
$
```

It is advisable to create a new directory to store your generated keys. It is also possible to name the files after the device they will be used for. For example:

```
$ mkdir keys
$ ssh-keygen -t rsa
Generating public/private rsa key pair.
```

```
Enter file in which to save the key (/home/user/.ssh/id_rsa):
/home/user/keys/control_room
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in /home/user/keys/control_room
Your public key has been saved in /home/user/keys/control_room.pub.
The key fingerprint is:
28:aa:29:38:ba:40:f4:11:5e:3f:d4:fa:e5:36:14:d6 user@server
$
```

You must ensure there is no password associated with the keys. If there is a password, then the devices will have no way to supply it as runtime.

Full documentation for the ssh-keygen command can be found at:

http://www.openbsd.org/cgi-bin/man.cgi?query=ssh-keygen

15.6.3 Installing the SSH Public/Private Keys (Clustering)

For Console Servers, the keys can be simply uploaded through the web interface on the System: Administration page. This enables you to upload stored RSA or DSA Public Key pairs to the Master and apply the Authorized key to the Slave as is described in Chapter 4.6. Once complete, proceed to Fingerprinting as described below.

15.6.4 Installing SSH Public Key Authentication (Linux)

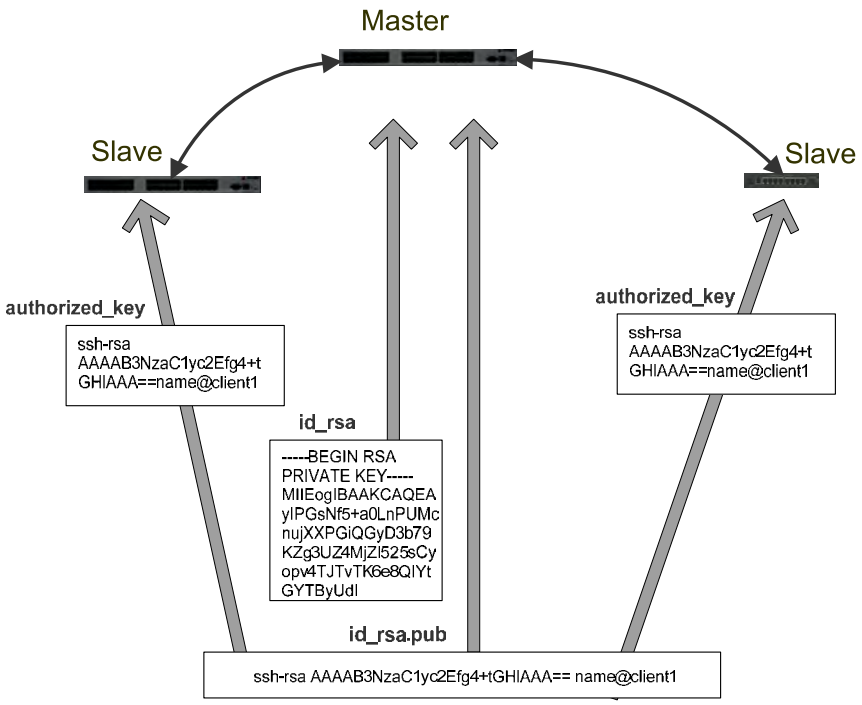
Alternately, the public key can be installed on the unit remotely from the Linux host with the scp utility as follows:

Assuming the user on the Management Console is called "fred"; the IP address of the Console Server is 192.168.0.1 (default); and the public key is on the linux/unix computer in ~/.ssh/id_dsa.pub. Execute the following command on the linux/unix computer:

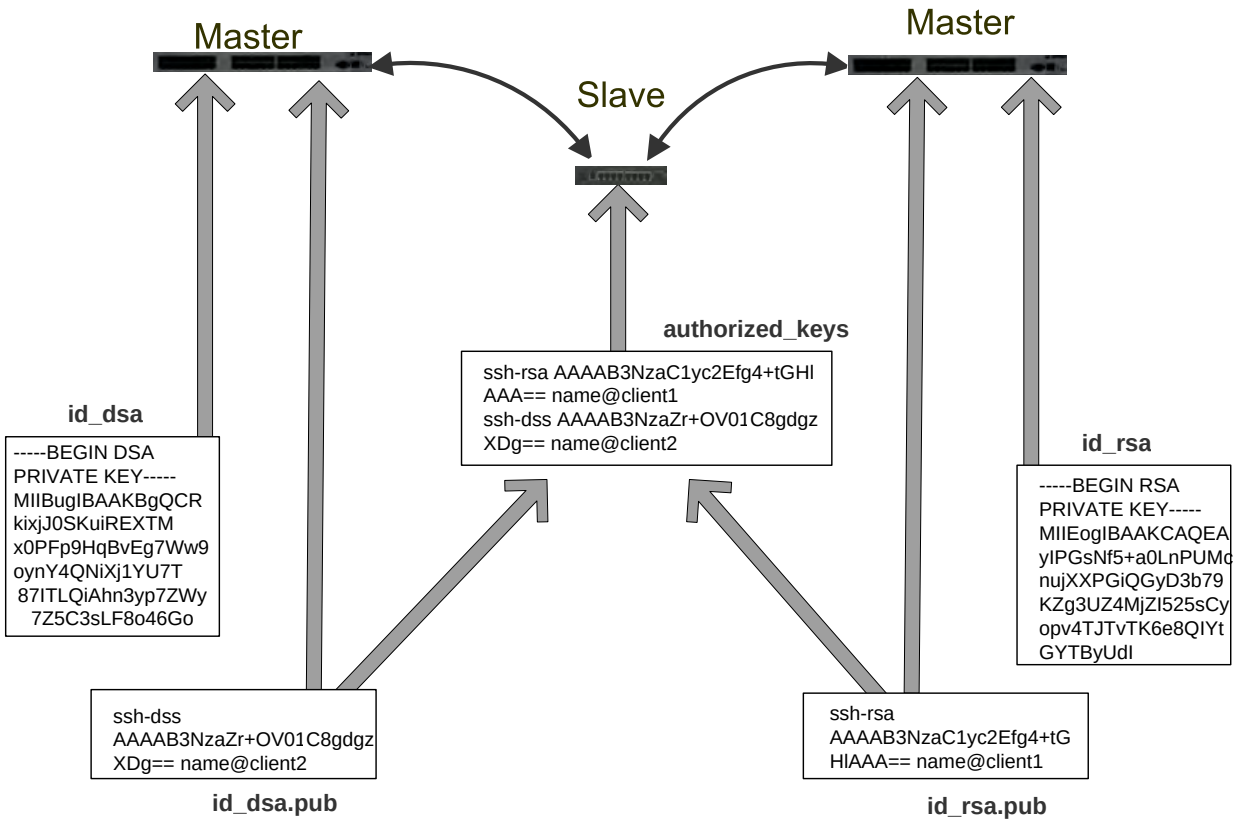
scp ~/.ssh/id_dsa.pub \
root@192.168.0.1:/etc/config/users/fred/.ssh/authorized_keys

The authorized_keys file on the Console Server needs to be owned by "fred", so login to the Management Console as root and type:

chown fred /etc/config/users/fred/.ssh/authorized_keys



If the Console Server device selected to be the server will only have one client device, then the authorized_keys file is simply a copy of the public key for that device. If one or more devices will be clients of the server, then the authorized_keys file will contain a copy of all of the public keys. RSA and DSA keys may be freely mixed in the authorized_keys file. For example, assume we already have one server, called bridge_server, and two sets of keys, for the control_room and the plant_entrance: $ ls /home/user/keys control_room control_room.pub plant_entrance plant_entrance.pub $ cat /home/user/keys/control_room.pub /home/user/keys/plant_entrance.pub > /home/user/keys/authorized_keys_bridge_server



More documentation on OpenSSH can be found at:

http://openssh.org/portable.html
http://www.openbsd.org/cgi-bin/man.cgi?query=ssh&sektion=1
http://www.openbsd.org/cgi-bin/man.cgi?query=sshd

15.6.5 Generating Public/Private Keys for SSH (Windows)

This section describes how to generate and configure SSH keys using Windows.

First create a new user from the Management Console on the Console Server (the following example users a user called "testuser") making sure it is a member of the "users" group.

If you do not already have a public/private key pair you can generate them now using ssh-keygen, PuTTYgen or a similar tool:

PuTTYgen:
http://www.chiark.greenend.org.uk/~sgtatham/putty/download.html

OpenSSH:

http://www.openssh.org/

OpenSSH (Windows):

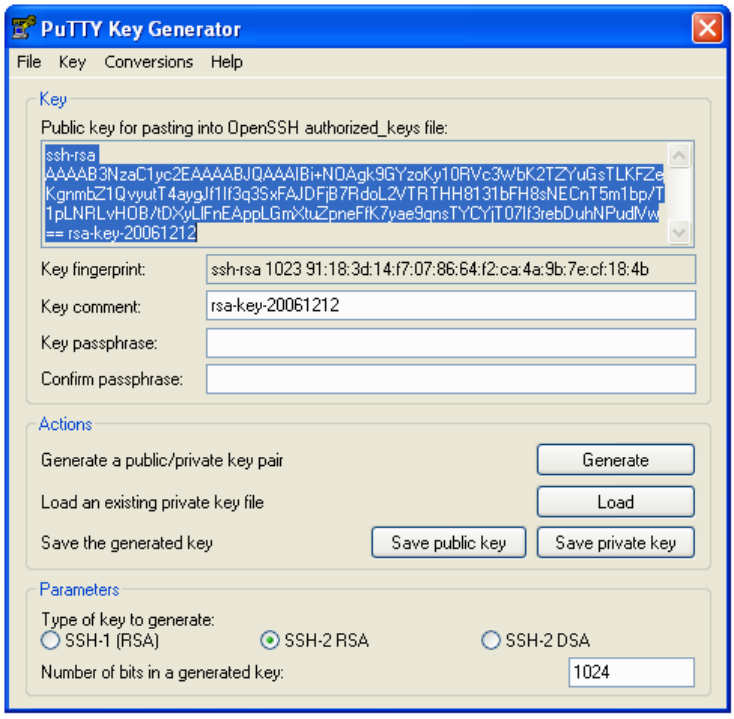
http://sshwindows.sourceforge.net/download/

For example, using PuTTYgen, make sure you have a recent version of the puttygen.exe (available from http://www.chiark.greenend.org.uk/~sgtatham/putty/download.html). Make sure you have a recent version of WinSCP (available from http://winscp.net/eng/download.php).

To generate a SSH key using PuTTY http://sourceforge.net/docs/F02/#clients:

- Execute the PUTTYGEN.EXE program
- Select the desired key type SSH2 DSA (you may use RSA or DSA) within the Parameters section
- It is important that you leave the passphrase field blank
- Click on the Generate button
- Follow the instruction to move the mouse over the blank area of the program in order to create random data used by PUTTYGEN to generate secure keys. Key generation will occur once PUTTYGEN has collected sufficient random data

.



- Create a new file " authorized_keys " (with notepad) and copy your public key data from the "Public key for pasting into OpenSSH authorized_keys file" section of the PuTTY Key Generator, and paste the key data to the "authorized_keys" file. Make sure there is only one line of text in this file

- Use WinSCP to copy this "authorized_keys" file into the users home directory: eg. /etc/config/users/testuser/.ssh/authorized_keys of the Console Server which will be the SSH server. You will need to make sure this file is in the correct format with the correct permissions with the following commands:

  ```
  # dos2unix  \
  /etc/config/users/testuser/.ssh/authorized_keys && chown testuser \
  /etc/config/users/testuser/.ssh/authorized_keys
  ```

  - Using WinSCP copy the attached sshd_config over /etc/config/sshd_config on the server (Makes sure public key authentication is enabled)

  - Test the Public Key by logging in as "testuser". Test the Public Key by logging in as "testuser" to the client device and typing (you should not need to enter anything): # ssh -o StrictHostKeyChecking=no <server-ip>

To automate connection of the SSH tunnel from the client on every power-up, you need to make the clients /etc/config/rc.local look like the following:

```
#!/bin/sh
ssh -L9001:127.0.0.1:4001 -N -o StrictHostKeyChecking=no testuser@<server-ip> &
```

This will run the tunnel redirecting local port 9001 to the server port 4001.

15.6.6 Fingerprinting

Fingerprints are used to ensure you are establishing an SSH session to who you think you are. On the first connection to a remote server, you will receive a fingerprint which you can use on future connections.

This fingerprint is related to the host key of the remote server. Fingerprints are stored in ~/.ssh/known_hosts.

To receive the fingerprint from the remote server, log in to the client as the required user (usually root) and establish a connection to the remote host:

```
# ssh remhost
```

```
The authenticity of host 'remhost (192.168.0.1)' can't be established.
RSA key fingerprint is 8d:11:e0:7e:8a:6f:ad:f1:94:0f:93:fc:7c:e6:ef:56.
Are you sure you want to continue connecting (yes/no)?
```

At this stage, answer yes to accept the key. You should get the following message:

```
Warning: Permanently added 'remhost,192.168.0.1' (RSA) to the list of known hosts.
```

You may be prompted for a password, but there is no need to log in: you have received the fingerprint and can Ctrl-C to cancel the connection.

If the host key changes, you will receive the following warning, and not be allowed to connect to the remote host:

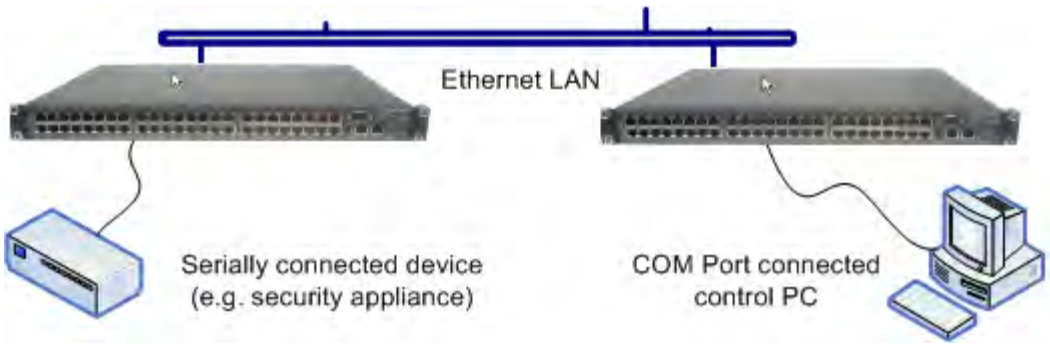
```
@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@
@    WARNING: REMOTE HOST IDENTIFICATION HAS CHANGED!          @
@    IT IS POSSIBLE THAT SOMEONE IS DOING SOMETHING NASTY!     @
@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@

Someone could be eavesdropping on you right now (man-in-the-middle attack)!
It is also possible that the RSA host key has just been changed.
The fingerprint for the RSA key sent by the remote host is:
ab:7e:33:bd:85:50:5a:43:0b:e0:bd:43:3f:1c:a5:f8.
Please contact your system administrator.
Add correct host key in /.ssh/known_hosts to get rid of this message.
Offending key in /.ssh/known_hosts:1
RSA host key for remhost has changed and you have requested strict checking.
Host key verification failed.
```

If the host key has been legitimately changed, it can be removed from the ~/.ssh/known_hosts file and the new fingerprint added. If it has not changed, this indicates a serious problem that should be investigated immediately.

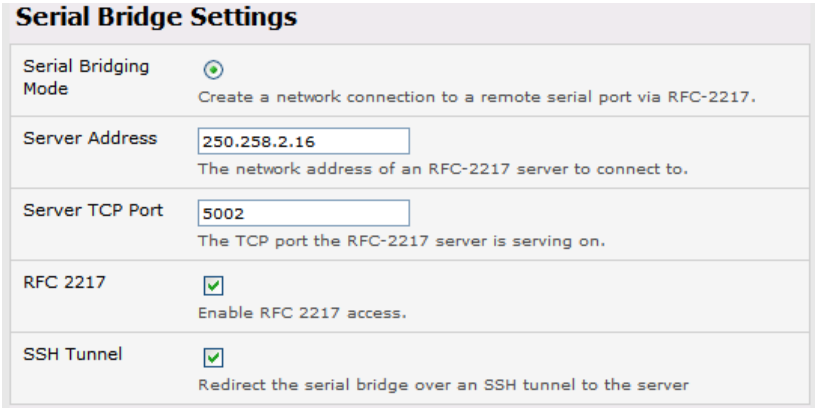
15.6.7 SSH Tunneled Serial Bridging

You have the option to apply SSH tunneling when two Console Servers are configured for serial bridging.



As detailed in Chapter 4, the Server gateway is set up in Console Server mode with either RAW or RFC2217 enabled and the Client gateway is set up in Serial Bridging Mode with the Server Address, and Server TCP Port (4000 + port for RAW or 5000 + port # for RFC2217) specified:

- Select SSH Tunnel when configuring the Serial Bridging Setting.


Serial Bridge Settings
Serial Bridging Mode
Create a network connection to a remote serial port via RFC-2217.
Server Address
250.258.2.16
The network address of an RFC-2217 server to connect to.
Server TCP Port
5002
The TCP port the RFC-2217 server is serving on.
RFC 2217
Enable RFC 2217 access.
SSH Tunnel
Redirect the serial bridge over an SSH tunnel to the server

Next you will need to set up SSH keys for each end of the tunnel and upload these keys to the Server and Client gateways.

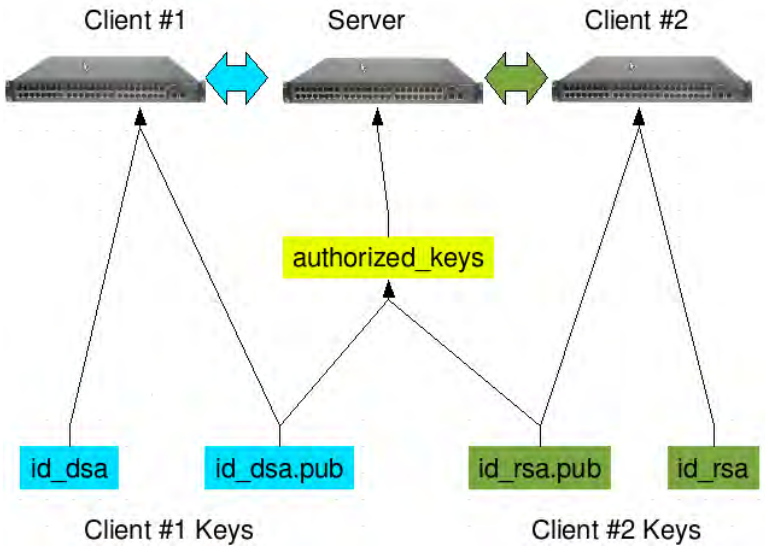
Client Keys

The first step in setting up SSH tunnels is to generate keys. Ideally, you will use a separate, secure machine to generate and store all keys to be used on the devices. However, if this is not ideal to your situation, keys may be generated on the Console Servers themselves.

It is possible to generate only one set of keys, and reuse them for every SSH session. While this is not recommended, each organization will need to balance the security of separate keys against the additional administration they bring.

Generated keys may be one of two types - RSA or DSA (and it is beyond the scope of this document to recommend one over the other). RSA keys will go into the files id_rsa and id_rsa.pub. DSA keys will be stored in the files id_dsa and id_dsa.pub.

For simplicity going forward, the term private key will be used to refer to either id_rsa or id_dsa and public key to refer to either id_rsa.pub or id_dsa.pub.



To generate the keys using OpenBSD's OpenSSH suite, we use the ssh-keygen program:

```
$ ssh-keygen -t [rsa|dsa]
Generating public/private [rsa|dsa] key pair.
Enter file in which to save the key (/home/user/.ssh/id_[rsa|dsa]):
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in /home/user/.ssh/id_[rsa|dsa].
Your public key has been saved in /home/user/.ssh/id_[rsa|dsa].pub.
The key fingerprint is:
28:aa:29:38:ba:40:f4:11:5e:3f:d4:fa:e5:36:14:d6 user@server
$
```

It is advisable to create a new directory to store your generated keys. It is also possible to name the files after the device they will be used for. For example:

```
$ mkdir keys
$ ssh-keygen -t rsa
Generating public/private rsa key pair.
Enter file in which to save the key (/home/user/.ssh/id_rsa):
/home/user/keys/control_room
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
```

```
Your identification has been saved in /home/user/keys/control_room
Your public key has been saved in /home/user/keys/control_room.pub.
The key fingerprint is:
28:aa:29:38:ba:40:f4:11:5e:3f:d4:fa:e5:36:14:d6 user@server
$
```

You should ensure there is no password associated with the keys. If there is a password, then the Console Server devices will have no way to supply it as runtime.

Authorized Keys

If the Console Server device selected to be the server will only have one client device, then the authorized_keys file is simply a copy of the public key for that device. If one or more devices will be clients of the server, then the authorized_keys file will contain a copy of all of the public keys. RSA and DSA keys may be freely mixed in the authorized_keys file.

For example, assume we already have one server, called bridge_server, and two sets of keys, for the control_room and the plant_entrance:

```
$ ls /home/user/keys
control_room control_room.pub plant_entrance plant_entrance.pub
$ cat /home/user/keys/control_room.pub
 /home/user/keys/plant_entrance.pub >
 /home/user/keys/authorized_keys_bridge_server
```

Uploading Keys

The keys for the server can be uploaded through the web interface, on the System: Administration page as detailed earlier. If only one client will be connecting, then simply upload the appropriate public key as the authorized keys file. Otherwise, upload the authorized keys file constructed in the previous step.

Each client will then need its own set of keys uploaded through the same page. Take care to ensure that the correct type of keys (DSA or RSA) go in the correct spots, and that the public and private keys are in the correct spot.

15.6.8 SDT Connector Public Key Authentication

SDT Connector can authenticate against a Console Server using your SSH key pair rather than requiring your to enter your password (i.e. public key authentication).

- To use public key authentication with SDT Connector, first you must first create an RSA or DSA key pair (using ssh-keygen, PuTTYgen or a similar tool) and add the public part of your SSH key pair to the Console Server – as described in the earlier section.

- Next, add the private part of your SSH key pair (this file is typically named id_rsa or id_dsa) to SDT Connector client. Click Edit -> Preferences -> Private Keys -> Add, locate the private key file and click OK. You do not have to add the public part of your SSH key pair, it is calculated using the private key.

SDT Connector will now use public key authentication when SSH connecting through the Console Server. You may have to restart SDT Connector to shut down any existing tunnels that were established using password authentication.

If you have a host behind the Console Server that you connect to by clicking the SSH button in SDT Connector, you can also configure it for public key authentication. Essentially, what you are using is SSH over SSH, and the two SSH connections are entirely separate, and the host configuration is entirely independent of SDT Connector and the Console Server. You must configure the SSH client that SDT Connector launches (e.g. Putty, OpenSSH) and the host's SSH server for public key authentication.

15.7 Secure Sockets Layer (SSL) Support

Secure Sockets Layer (SSL) is a protocol developed by Netscape for transmitting private documents via the Internet. SSL works by using a private key to encrypt data that's transferred over the SSL connection.

The Console Server includes OpenSSL. The OpenSSL Project is a collaborative effort to develop a robust, commercial-grade, full-featured, and Open Source toolkit implementing the Secure Sockets Layer (SSL v2/v3) and Transport Layer Security (TLS v1) protocols as well as a full-strength general purpose cryptography library. The project is managed by a worldwide community of volunteers that use the Internet to communicate, plan, and develop the OpenSSL toolkit and its related documentation.

OpenSSL is based on the excellent SSLeay library developed by Eric A. Young and Tim J. Hudson. The OpenSSL toolkit is licensed under an Apache-style license, which basically means that you are free to get and use it for commercial and non-commercial purposes, subject to some simple license conditions. In the Console Server, OpenSSL is used primarily in conjunction with ‘http’ in order to have secure browser access to the GUI management console across insecure networks.

More documentation on OpenSSL is available from:

http://www.openssl.org/docs/apps/openssl.html

http://www.openssl.org/docs/HOWTO/certificates.txt

15.8 HTTPS

The Management Console can be served using HTTPS by running the webserver via sslwrap. The server can be launched on request using inetd.

The HTTP server provided is a slightly modified version of the fnord-httpd from http://www.fefe.de/fnord/

The SSL implementation is provided by the sslwrap application compiled with OpenSSL support. More detailed documentation can be found at http://www.rickk.com/sslwrap/

If your default network address is changed or the unit is to be accessed via a known Domain Name, you can use the following steps to replace the default SSL Certificate and Private Key with ones tailored for your new address.

1. Generating an Encryption Key

To create a 1024-bit RSA key with a password, issue the following command on the command line of a Linux host with the openssl utility installed:

```
openssl genrsa -des3 -out ssl_key.pem 1024
```

2. Generating a Self-Signed Certificate with OpenSSL

This example shows how to use OpenSSL to create a self-signed certificate. OpenSSL is available for most Linux distributions via the default package management mechanism. (Windows users can check http://www.openssl.org/related/binaries.html)

To create a 1024-bit RSA key and a self-signed certificate, send the following openssl command from the host you have openssl installed on:

```
openssl req -x509 -nodes -days 1000 \
                                -newkey rsa:1024 -keyout ssl_key.pem -out ssl_cert.pem
```

You will be prompted to enter a lot of information. Most of it doesn't matter, but the "Common Name" should be the domain name of your computer (e.g. test.tripplite.com). When you have entered everything, the certificate will be created in a file called ssl_cert.pem.

3. Installing the Key and Certificate

The recommended method for copying files securely to the Console Server unit is with an SCP (Secure Copying Protocol) client. The scp utility is distributed with OpenSSH for most Unices, while Windows users can use something like the PSCP command line utility available with PuTTY.

The files created in steps 1 and 2 can be installed remotely with the scp utility as follows:

scp ssl_key.pem root@<address of unit>:/etc/config/
scp ssl_cert.pem root@<address of unit>:/etc/config/

or using PSCP:

pscp -scp ssl_key.pem root@<address of unit>:/etc/config/
pscp -scp ssl_cert.pem root@<address of unit>:/etc/config/

PuTTY and the PSCP utility can be downloaded from:
http://www.chiark.greenend.org.uk/~sgtatham/putty/download.html

More detailed documentation on the PSCP can be found:
http://the.earth.li/~sgtatham/putty/0.58/htmldoc/Chapter5.html#pscp

4. Launching the HTTPS Server

Note that the easiest way to enable the HTTPS server is from the Management Console. Simply click the appropriate checkbox in Network -> Services -> HTTPS Server and the HTTPS server will be activated (assuming the ssl_key.pem & ssl_cert.pem files exist in the /etc/config directory).

Alternatively, inetd can be configured to launch the secure fnord server from the command line of the unit as follows:

Edit the inetd configuration file. From the unit command line:

vi /etc/config/inetd.conf

Append a line:

443 stream tcp nowait root sslwrap -cert /etc/config/ssl_cert.pem -key /etc/config/ssl_key.pem -exec /bin/httpd /home/httpd"

Save the file and signal inetd of the configuration change.

kill -HUP `cat /var/run/inetd.pid`

The HTTPS server should be accessible from a web client at a URL similar to this:
https://<common name of unit>

More detailed documentation about the openssl utility can be found at the website:
http://www.openssl.org/

15.9 Power Strip Control

The Console Server supports a growing list of remote power-control devices (RPCs) which can be configured using the Management Console as described in Chapter 8. These RPCs are controlled using the open source NUT and PowerMan tools and the pmpower utility.

15.9.1 PowerMan

PowerMan provides power management in a data center or compute cluster environment. It performs operations such as power on, power off, and power cycle via remote power controller (RPC) devices. Target hostnames are mapped to plugs on RPC devices in powerman.conf powerman - power on/off nodes.

Synopsis
powerman [-option] [targets]
pm [-option] [targets]

Options
-1, --on Power ON targets.
-0, --off Power OFF targets.
-c, --cycle Power cycle targets.
-r, --reset Assert hardware reset for targets (if implemented by RPC).
-f, --flash Turn beacon ON for targets (if implemented by RPC).
-u, --unflash Turn beacon OFF for targets (if implemented by RPC).
-l, --list List available targets. If possible, output will be compressed into a host range (see TARGET SPECIFICATION below).
-q, --query Query plug status of targets. If none specified, query all targets. Status is not cached; each time this option is used, powermand queries the appropriate RPC's.

Targets connected to RPC's that could not be contacted (e.g. due to network failure) are reported as status "unknown". If possible, output will be compressed into host ranges.

-n, --node Query node power status of targets (if implemented by RPC). If no targets are specified, query all targets. In this context, a node in the OFF state could be ON at the plug but operating in standby power mode.

-b, --beacon Query beacon status (if implemented by RPC). If no targets are specified, query all targets.

-t, --temp Query node temperature (if implemented by RPC). If no targets are specified, query all targets. Temperature information is not interpreted by powerman and is reported as received from the RPC on one line per target, prefixed by target name.

-h, --help Display option summary.

-L, --license Show powerman license information.

-d, --destination host[:port] Connect to a powerman daemon on non-default host and optionally port.

-V, --version Display the powerman version number and exit.

-D, --device Displays RPC status information. If targets are specified, only RPC's matching the target list are displayed.

-T, --telemetry Causes RPC telemetry information to be displayed as commands are processed. Useful for debugging device scripts.

-x, --exprange Expand host ranges in query responses.

For more details refer http://linux.die.net/man/1/powerman. Also refer powermand (http://linux.die.net/man/1/powermand) documentation and powerman.conf (http://linux.die.net/man/5/powerman.conf).

Target Specification

Powerman target hostnames may be specified as comma-separated or space-separated hostnames or host ranges. Host ranges are of the general form: prefix[n-m,l-k,...], where n < m and l < k, etc., This form should not be confused with regular expression character classes (also denoted by ''[]''). For example, foo[19] does not represent foo1 or foo9, but rather represents a degenerate range: foo19.

This range syntax is meant only as a convenience on clusters with a prefix NN naming convention and specification of ranges should not be considered necessary -- the list foo1,foo9 could be specified as such, or by the range foo[1,9].

Some examples of powerman targets follow:

Power on hosts bar,baz,foo01,foo02,...,foo05: powerman --on bar baz foo[01-05]

Power on hosts bar,foo7,foo9,foo10: powerman --on bar,foo[7,9-10]

Power on foo0,foo4,foo5: powerman --on foo[0,4-5]

As a reminder to the reader, some shells will interpret brackets ([and]) for pattern matching. Depending on your shell, it may be necessary to enclose ranged lists within quotes. For example, in tcsh, the last example above should be executed as:

powerman --on "foo[0,4-5]"

15.9.2 pmpower

The pmpower command is a high-level tool for manipulating remote, preconfigured power devices connected to the Console Servers either via a serial or network connection.

pmpower [-?h] [-l device | -r host] [-o outlet] [-u username] [-p password] action

-?/-h	This help message.
-l	The serial port to use.
-o	The outlet on the power target to apply to.
-r	The remote host address for the power target.
-u	Override the configured username.
-p	Override the configured password.
on	This action switches the specified device or outlet(s) ON.
off	This action switches the specified device or outlet(s) OFF.
cycle	This action switches the specified device or outlet(s) OFF and ON again.
status	This action retrieves the current status of the device or outlet.

Examples:

To turn outlet 4 of the power device connected to serial port 2 on:

```
# pmpower -l port02 -o 4 on
```

To turn an IPMI device located at IP address 192.168.1.100 to OFF (where username is 'root' and password is 'calvin':

```
# pmpower -r 192.168.1.100 -u root -p calvin off
```

Default system Power Device actions are specified in /etc/powerstrips.xml. Custom Power Devices can be added in /etc/config/powerstrips.xml. If an action is attempted which has not been configured for a specific Power Device, pmpower will exit with an error.

15.9.3 Adding New RPC Devices

There are two simple paths to adding support for new RPC devices.

The first is to have scripts to support the particular RPC included in the open source PowerMan project (http://sourceforge.net/projects/powerman). The PowerMan device specifications are unusual and it is suggested that you leave the actual writing of these scripts to the PowerMan authors. However documentation on how they work can be found at http://linux.die.net/man/5/powerman.dev. Once the new RPC support has been built into the PowerMan, we will include the updated PowerMan build in a subsequent firmware release.

The second path is to directly add support for the new RPC devices (or to customize the existing RPC device support) on your particular Console Server. The Manage: Power page uses information contained in /etc/powerstrips.xml to configure and control devices attached to a serial port. The configuration also looks for (and loads) /etc/config/powerstrips.xml if it exists.

The user can add their own support for more devices by putting definitions for them into /etc/config/powerstrips.xml. This file can be created on a host system and copied to the Management Console device using scp. Alternatively, login to the Management Console and use ftp or wget to transfer files.

Here is a brief description of the elements of the XML entries in /etc/config/powerstrips.xml.

```
<powerstrip>
        <id>Name or ID of the device support</id>
        <outlet port="port-id-1">Display Port 1 in menu</outlet>
        <outlet port="port-id-2">Display Port 2 in menu</outlet>
        ...
        <on>script to turn power on</on>
        <off>script to power off</off>
        <cycle>script to cycle power</cycle>
        <status>script to write power status to /var/run/power-status</status>
        <speed>baud rate</speed>
        <charsize>character size</charsize>
        <stop>stop bits</stop>
        <parity>parity setting</parity>
</powerstrip>
```

The id appears on the web page in the list of available devices types to configure.

The outlets describe targets that the scripts can control. For example, a power control board may control several different outlets. The port-id is the native name for identifying the outlet.

This value will be passed to the scripts in the environment variable outlet, allowing the script to address the correct outlet.

There are four possible scripts: on, off, cycle and status.

When a script is run, its standard input and output is redirected to the appropriate serial port. The script receives the outlet and port in the outlet and port environment variables respectively.

The script can be anything that can be executed within the shell.

All of the existing scripts in /etc/powerstrips.xml use the pmchat utility.

pmchat works just like the standard unix "chat" program, only it ensures interoperation with the port manager.

The final options, speed, charsize, stop and parity define the recommended or default settings for the attached device.

15.10 IPMItool

The Console Server includes the ipmitool utility for managing and configuring devices that support the Intelligent Platform Management Interface (IPMI) version 1.5 and version 2.0 specifications.

IPMI is an open standard for monitoring, logging, recovery, inventory, and control of hardware that is implemented independent of the main CPU, BIOS, and OS. The service processor (or Baseboard Management Controller, BMC) is the brain behind platform management and its primary purpose is to handle the autonomous sensor monitoring and event logging features.

The ipmitool program provides a simple command-line interface to this BMC. It features the ability to read the sensor data repository (SDR) and print sensor values, display the contents of the System Event Log (SEL), print Field Replaceable Unit (FRU) inventory information, read and set LAN configuration parameters, and perform remote chassis power control.

Synopsis

ipmitool [-c|-h|-v|-V] -I open <command>

ipmitool [-c|-h|-v|-V] -I lan -H <hostname>
[-p <port>]

[-U <username>]
[-A <authtype>]
[-L <privlvl>]
[-a|-E|-P|-f <password>]
[-o <oemtype>]
<command>

ipmitool [-c|-h|-v|-V] -I lanplus -H <hostname>
[-p <port>]
[-U <username>]
[-L <privlvl>]
[-a|-E|-P|-f <password>]
[-o <oemtype>]
[-C <ciphersuite>]
<command>

Description

This program lets you manage Intelligent Platform Management Interface (IPMI) functions of either the local system, via a kernel device driver, or a remote system, using IPMI V1.5 and IPMI v2.0. These functions include printing FRU information, LAN configuration, sensor readings, and remote chassis power control.

IPMI management of a local system interface requires a compatible IPMI kernel driver to be installed and configured. On Linux, this driver is called OpenIPMI and it is included in standard distributions. On Solaris, this driver is called BMC and is included in Solaris 10. Management of a remote station requires the IPMI-over-LAN interface to be enabled and configured. Depending on the particular requirements of each system, it may be possible to enable the LAN interface using ipmitool over the system interface.

Options

-a Prompt for the remote server password.

-A <authtype>
Specify an authentication type to use during IPMIv1.5 lan session activation. Supported types are NONE, PASSWORD, MD5, or OEM.

-c Present output in CSV (comma separated variable) format. This is not available with all commands.

-C <ciphersuite>
The remote server authentication, integrity, and encryption algorithms to use for IPMIv2 lanplus connections. See table 22-19 in the IPMIv2 specification. The default is 3 which specifies RAKP-HMAC-SHA1 authentication, HMAC-SHA1-96 integrity, and AES-CBC-128 encryption algorithms.

-E The remote server password is specified by the environment variable IPMI_PASSWORD.

-f <password_file>
Specifies a file containing the remote server password. If this option is absent, or if password_file is empty, the password will default to NULL.
-h Get basic usage help from the command line.
-H <address>
Remote server address can be an IP address or hostname. This option is required for lan and lanplus interfaces.
-I <interface>
Selects IPMI interface to use. Supported interfaces that are compiled in and visible in the usage help output.
-L <privlvl>
Force session privilege level. Can be CALLBACK, USER, OPERATOR, ADMIN. Default is ADMIN.
-m <local_address>
Set the local IPMB address. The default is 0x20 and there should be no need to change it for normal operation.
-o <oemtype>
Select OEM type to support. This usually involves minor hacks in place in the code to work around quirks in various BMCs from various manufacturers. Use -o list to see a list of current supported OEM types.
-p <port>
Remote server UDP port to connect to. Default is 623.
-P <password>
Remote server password is specified on the command line. If supported, it will be obscured in the process list. Note! Specifying the password as a command line option is not recommended.
-t <target_address>
Bridge IPMI requests to the remote target address.
-U <username>
Remote server username, default is NULL user.
-v Increase verbose output level. This option may be specified multiple times to increase the level of debug output. If given three times, you will get hexdumps of all incoming and outgoing packets.
-V Display version information.

If no password method is specified, then ipmitool will prompt the user for a password. If no password is entered at the prompt, the remote server password will default to NULL.

Security

The ipmitool documentation highlights that there are several security issues to be considered before enabling the IPMI LAN interface. A remote station has the ability to control a system's power state as well as being able to gather certain platform information. To reduce vulnerability, it is strongly advised that the IPMI LAN interface only be enabled in 'trusted'

environments where system security is not an issue or where there is a dedicated secure 'management network' or access has been provided through an Console Server.

Further, it is strongly advised that you should not enable IPMI for remote access without setting a password, and that the password should not be the same as any other password on that system.

When an IPMI password is changed on a remote machine with the IPMIv1.5 lan interface, the new password is sent across the network as clear text. This could be observed and then used to attack the remote system. It is thus recommended that IPMI password management only be done over IPMIv2.0 lanplus interface or the system interface on the local station.

For IPMI v1.5, the maximum password length is 16 characters. Passwords longer than 16 characters will be truncated.

For IPMI v2.0, the maximum password length is 20 characters; longer passwords are truncated.

Commands

help

This can be used to get command-line help on ipmitool commands. It may also be placed at the end of commands to get option usage help.

ipmitool help

Commands:

raw	Send a RAW IPMI request and print response
lan	Configure LAN Channels
chassis	Get chassis status and set power state
event	Send pre-defined events to MC
mc	Management Controller status and global enables
sdr	Print Sensor Data Repository entries and readings
sensor	Print detailed sensor information
fru	Print built-in FRU and scan SDR for FRU locators
sel	Print System Event Log (SEL)
pef	Configure Platform Event Filtering (PEF)
sol	Configure IPMIv2.0 Serial-over-LAN
isol	Configure IPMIv1.5 Serial-over-LAN
user	Configure Management Controller users
channel	Configure Management Controller channels
session	Print session information
exec	Run list of commands from file
set	Set runtime variable for shell and exec

ipmitool chassis help

Chassis Commands: status, power, identify, policy, restart_cause, poh, bootdev

ipmitool chassis power help

chassis power Commands: status, on, off, cycle, reset, diag, soft

You will find more details on ipmitools at http://ipmitool.sourceforge.net/manpage.html

15.11 Scripts for Managing Slaves

When the Console Servers are cascaded, the Master is in control of the serial ports on the Slaves, and the Master's Management Console provides a consolidated view of the settings for its own and all the Slave's serial ports. However, the Master does not provide a fully consolidated view, e.g. Status: Active Users. It only displays those users active on the Master's ports. You will need to write a custom bash script that parses the port logs if you want to find out who's logged in to cascaded serial ports from the master.

You will probably also want to enable remote or USB logging, as local logs only buffer 8K of data and don't persist between reboots.

This script would parse each port log file line by line. Each time it sees 'LOGIN: username', it adds the username to the list of connected users for that port, each time it sees 'LOGOUT: username' it removes it from the list. The list can then be nicely formatted and displayed. It is also possible to run this as a CGI script on the B092-016. In this case, the remote/USB logged port logs files are in: /var/run/portmanager/logdir (or they are in /var/log). Otherwise you can run the script on the remote log server.

To enable log storage and connection logging:
- Select Alerts & Logging: Port Log
- Configure log storage
- Select Serial & Network: Serial Port, Edit the serial port(s)
- Under Console Server, select Logging Level 1 and click Apply

To run the CGI script on the Console Server:
- Login to the B092-016
- Run: mount -o remount,rw /dev/hda1 /
- Copy the script to /home/httpd/cgi-bin/
- Run: mount -o remount,ro /dev/hda1 /
- Browse to: http://192.168.0.1/cgi-bin/yourscript.cgi where 192.168.0.1 is the IP address of the Console Server and yourscript.cgi is the name of the script

There is a useful tutorial on creating a bash script CGI at:
http://www.yolinux.com/TUTORIALS/LinuxTutorialCgiShellScript.html

Similarly the Master maintains a view of the status of the Slaves:

- Select Status: Support Report
- Scroll down to Processes
- Look for: /bin/ssh -MN -o ControlPath=/var/run/cascade/%h Slavename
- These are the Slaves that are connected
- Note: The end of the Slaves' names will be truncated, so the first 5 characters must be unique

Alternatively, you can write a custom CGI script as described above. The currently connected Slaves can be determined by running: ls /var/run/cascade and the configured Slaves can be displayed by running: config -g config.cascade.Slaves

16. THIN CLIENT (B092-016)

Introduction

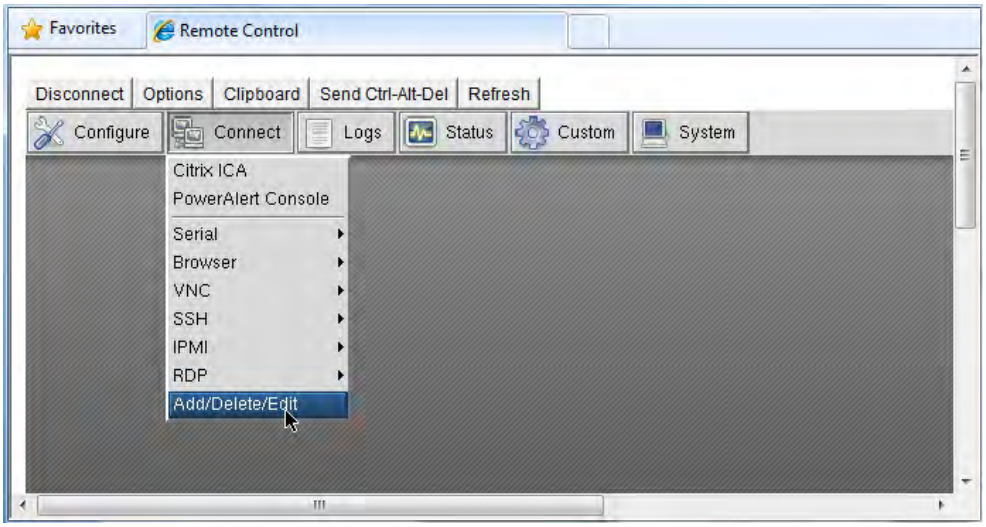
The B092-016 has a selection of management clients (Firefox browser, SSH, Telnet, VNC viewer, ICA, RDP) embedded as well as the Tripp Lite PowerAlert software. With these, the B092-016 provides rack side control of computers, networking, telecom, power and other managed devices via serial, USB or IP over the LAN.

This chapter provides instructions on configuring the thin clients and using them locally and remotely. The thin clients can be controlled from the rack side using a direct monitor/keyboard/mouse connected to the B092-016 or remotely using a VNC connection from the remote user to the B092-016.

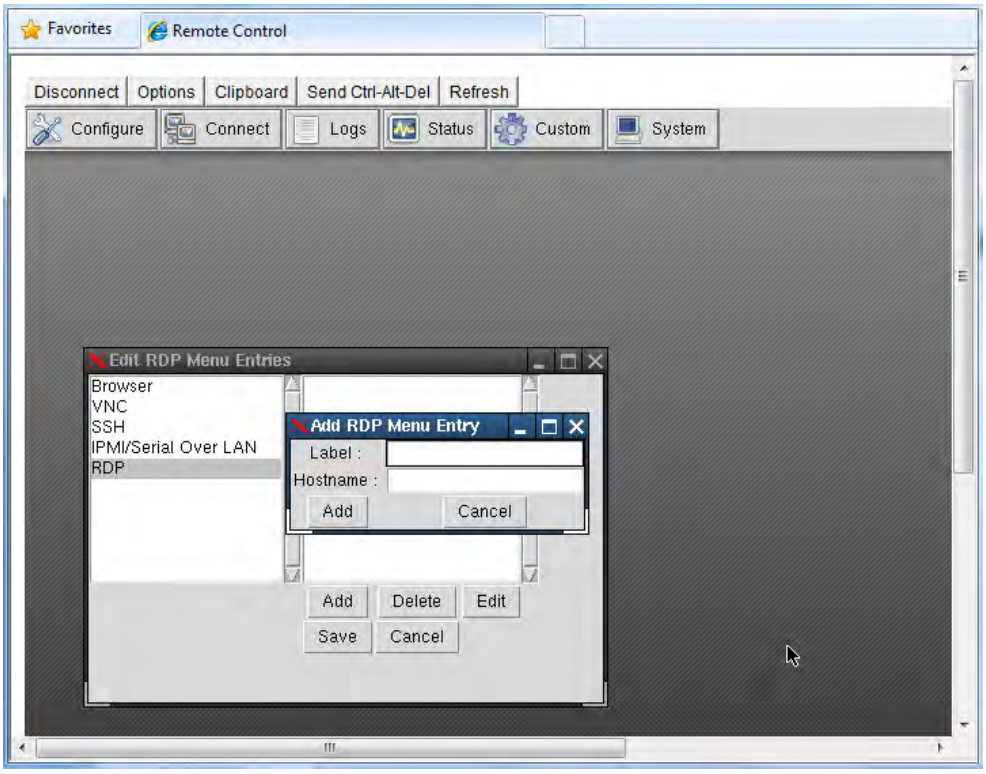
16.1 Local Client Service Connections

These client connections first need to be configured:

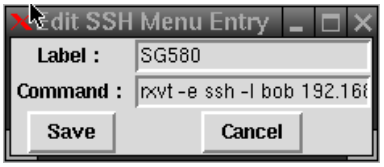
- Select Connect: Add/Delete/Edit on the control panel.



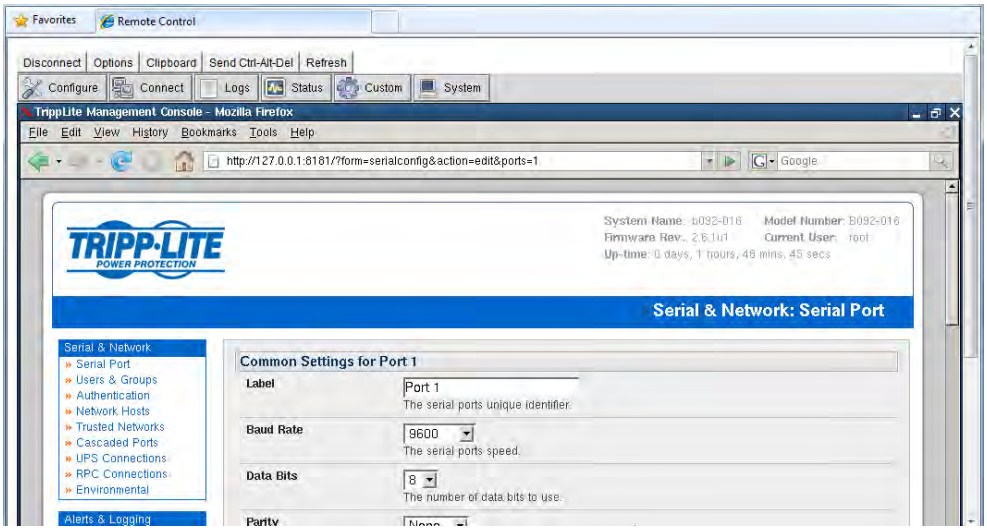
- Then select a Connect client (such as RDP) and click Add to configure the Host connection for that client service.



- For each new Host you add, you will be asked to enter a Label (enter a descriptive name) and a Hostname (enter the IP Address or DNS Name of the new network connected Host) and possibly a Username (enter the name you will use to log in to the Host).
- Once a Host has been added, you can select Edit and update the commands that will be executed in connecting the service to the existing Host.

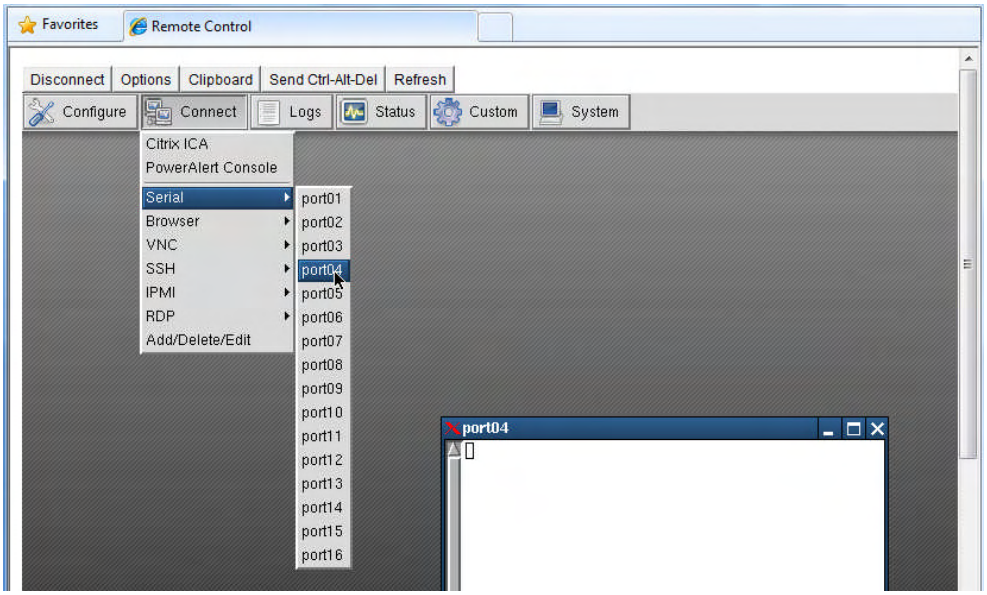


- The sixteen serial ports are pre-configured by default in Console Server mode for the B096-016 / B096-048 Console Server Management Switch or in UPS (PowerAlert) mode for the B092-016 Console Server with PowerAlert product. To change these settings, select Configure, which will load the local Firefox browser and run the Management Console. You can then reconfigure the serial ports as detailed in Chapter 4.



16.1.1 Connect- Serial Terminal

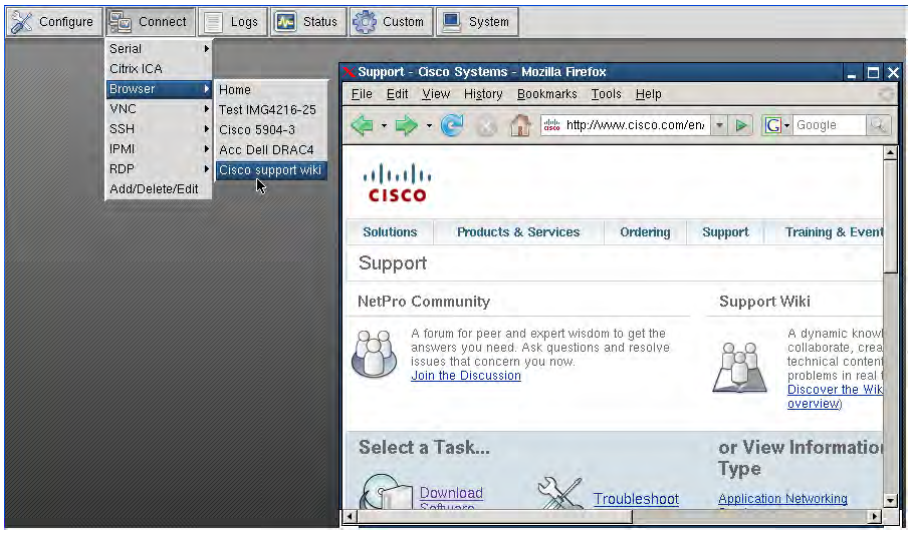
- Select Connect: Serial on the control panel and click on the desired serial port. A window will be created with a connection to the device on the selected serial port:



The embedded terminal emulator uses rxvt (a color vt102 terminal emulator). You can find more details on configuration options in http://www.rxvt.org/manual.html

16.1.2 Connect- Browser

- Select Connect: Browser on the control panel and click on the Host/web site you have configured to be accessed using the browser. Sites can be internal or external.



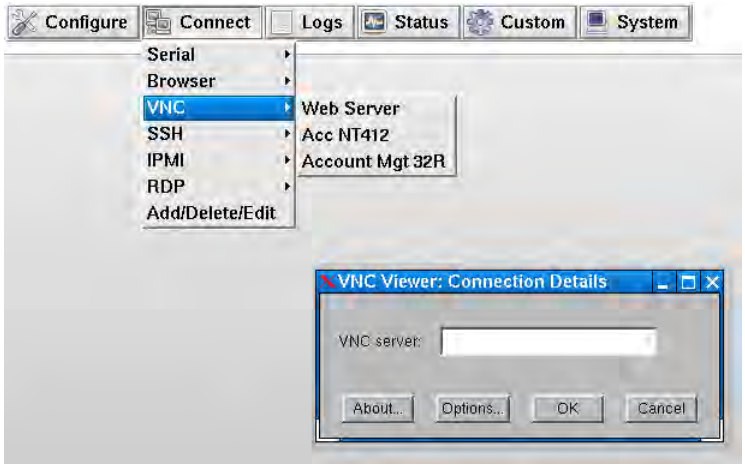
The B092-016 provides a powerful Mozilla Firefox browser with a licensed Sun Java JRE.

Firefox
version 2.0.0.11
©1998-2007 Contributors. All Rights Reserved.
Firefox and the Firefox logos are trademarks of the Mozilla Foundation. All rights reserved. Some trademark rights used under license from The Charlton Company.
Mozilla/5.0 (X11; U; Linux i586; en-US; rv:1.8.1.11) Gecko/20080730 Firefox/2.0.0.11

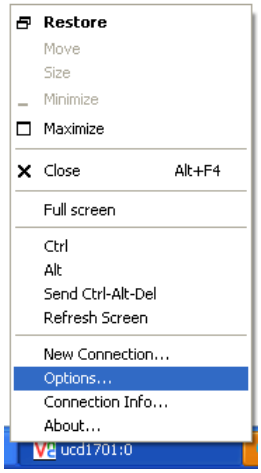
Java and all Java based trademarks and logos are trademarks or registered trademarks of Sun Microsystems, Inc. in the U.S. and other countries.

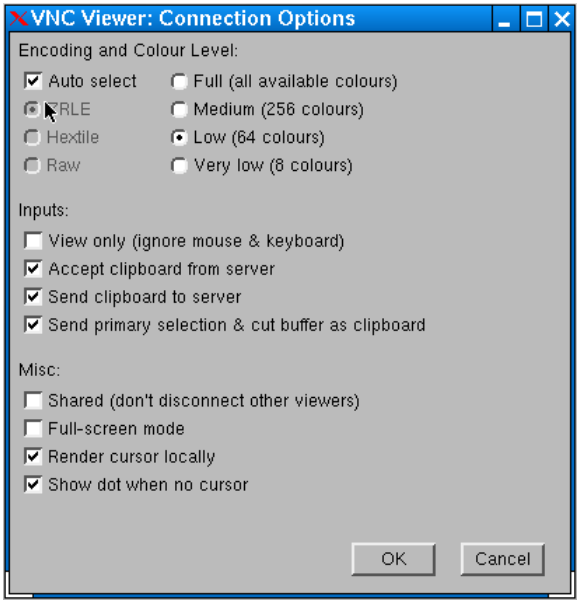
16.1.3 Connect- VNC

- Select Connect: VNC on the control panel and click on the VNC server Host to be accessed.
- The VNC Viewer client in your B092-016 will be started and a VNC connection window to the selected server will be opened.



- If the HostName was left blank when the VNC server connection was configured, then the VNC Viewer will start with a request for the VNC server.
- Selecting Options at this stage enables you to configure the VNC Viewer.
- Alternately, you can select Options by right-clicking on the VNC Viewer task Bar icon.





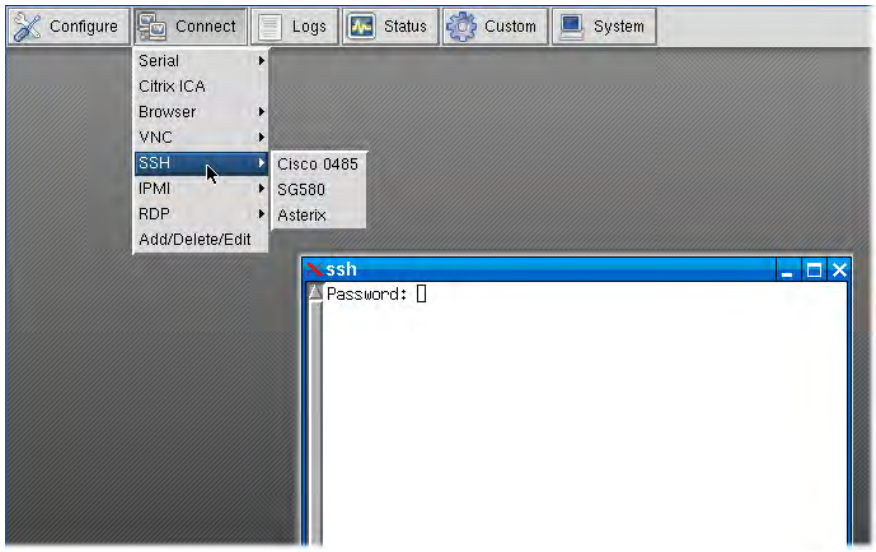
You can find more details on configuration options in:

http://www.realvnc.com/products/free/4.1/man/vncviewer.html

16.1.4 Connect- SSH

SSH is typically used to log into a remote machine and execute commands.

- Select Connect: SSH on the control panel and click on the Host to be accessed.
- An SSH connection window will be opened. Enter the SSH login password and you will be securely connected to the selected Host.



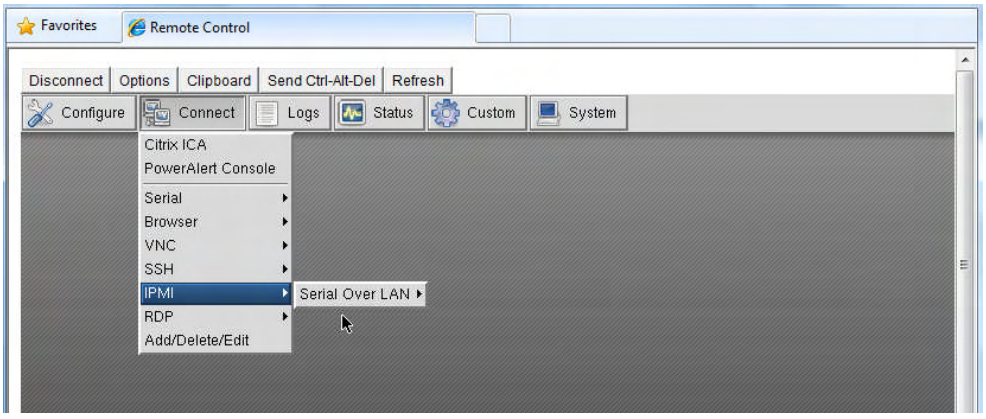
The B092-016 SSH connection uses OpenSSH (http://www.openssh.com/) and the terminal connection is presented using rxvt (ouR XVT). You can find more details on configuration options in: http://www.rxvt.org/manual.html

16.1.5 Connect- IPMI

The B092-016 control panel provides a number of IPMI tools for managing service processors or Baseboard Management Controllers (BMCs). These IPMI controls are built on the ipmitools program. Find more details on configuration options in http://ipmitool.sourceforge.net/manpage.html

The ipmitool program provides a simple command-line interface to the BMCs and features the ability to read the sensor data repository (SDR), display the contents of the System Event Log (SEL), read and set LAN configuration parameters, and perform remote chassis power control. The B092-016 Management Console also has additional tools for controlling power units with IPMI interfaces (refer to Chapter 8).

- Select Connect: IPMI on the control panel and select the Serial over LAN connection to be accessed.

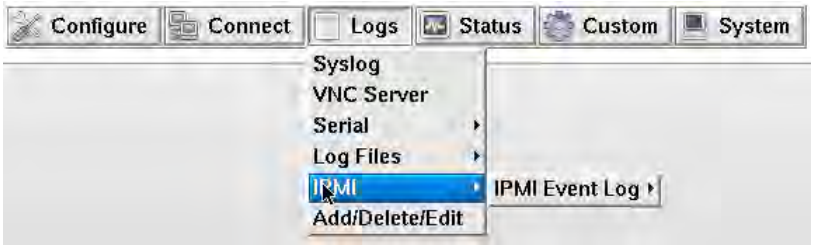


This will launch a Serial-Over-LAN session by running:

```
# ipmitool -I lanplus -H hostname -U username -P password sol activate
```

The resulting serial character connection is presented in an rxvt (ouR XVT) window. Also the Serial-Over-LAN feature is only applicable to IPMI2.0 devices.

- Select Logs: IPMI on the control panel and select the IPMI Event Log to be viewed.

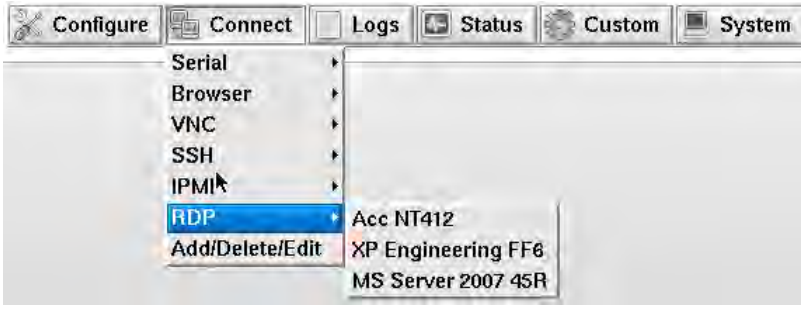


This will retrieve the selected IPMI event log by running:

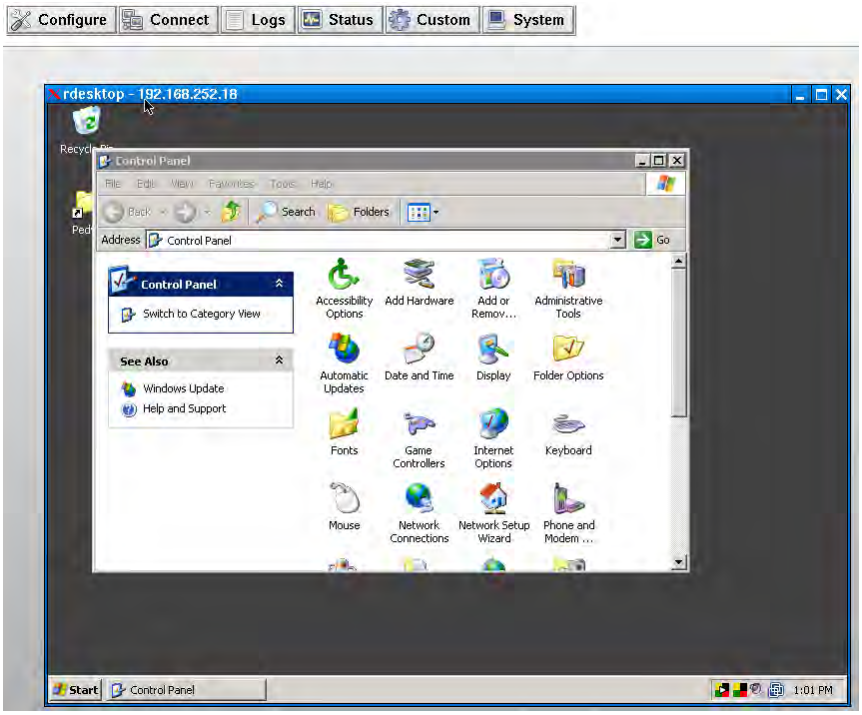
ipmitool -I lanplus -H hostname -U username -P password sel info

16.1.6 Connect- Remote Desktop (RDP)

- Select Connect: RDP on the control panel and click on the Windows computer to be accessed.



- The rdesktop program in your B092-016 will be started, an RDP connection to the Remote Desktop server in the selected computer will be opened, the rdesktop window will appear on your B092-016 screen and you will be prompted for a password. (If the selected computer does not have RDP access enabled, then the rdesktop window will not appear.)



You can use Add/Delete/Edit to customize the rdesktop client (e.g. to include login username passwords). The command line protocol is:

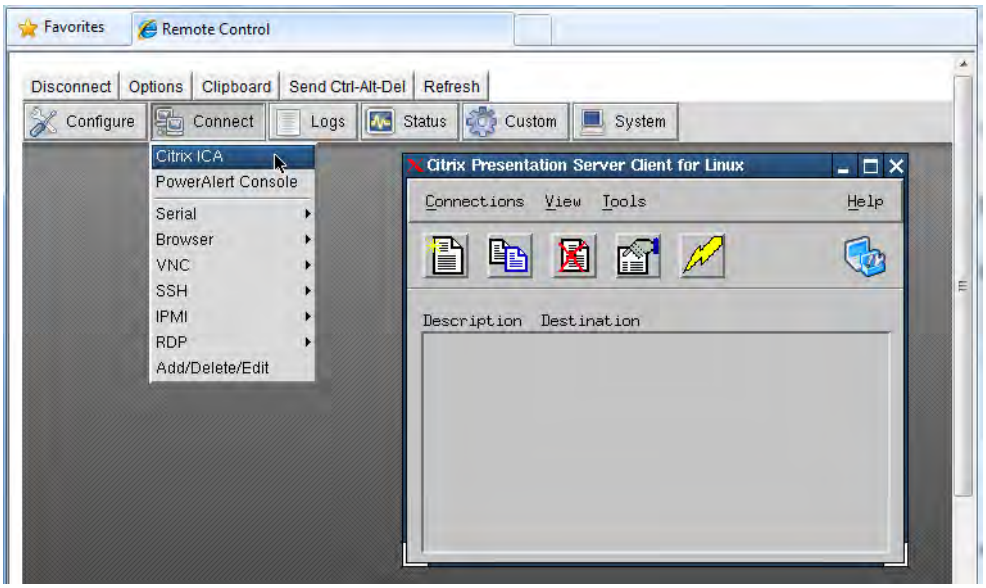
rdesktop -u windows-user-id -p windows-password -g 1200x950 ms-windows-terminal-server-host-name

option	Description
-a	Color depth: 8, 16, 24
-r	Device redirection. i.e. Redirect sound on remote machine to local device i.e. -0 -r sound (MS/Windows 2003)
-g	Geometry: widthxheight or 70% screen percentage
-p	Use -p - to receive password prompt

Further information on rdesktop can be found at http://www.rdesktop.org/

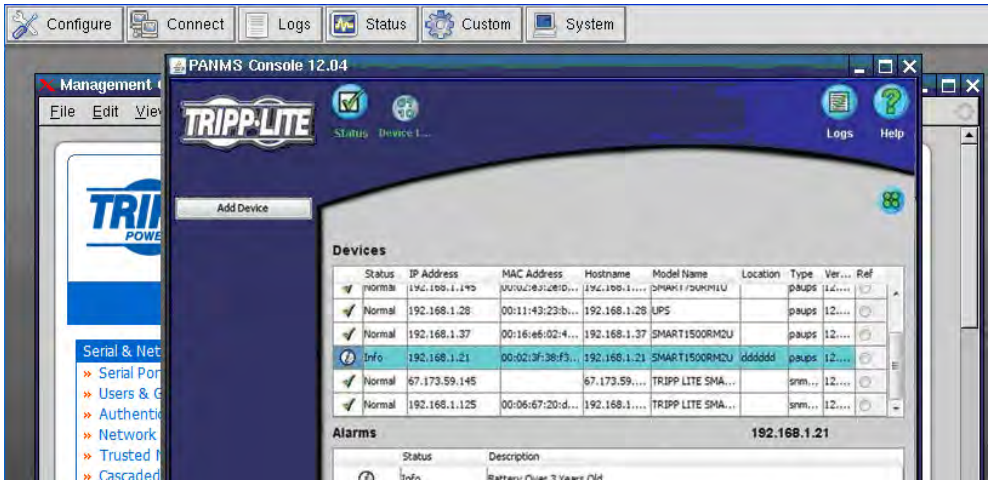
16.1.7 Connect- Citrix ICA

- Select Connect: Citrix ICA on the control panel and click on the Citrix server to be accessed.



16.1.8 Connect- PowerAlert

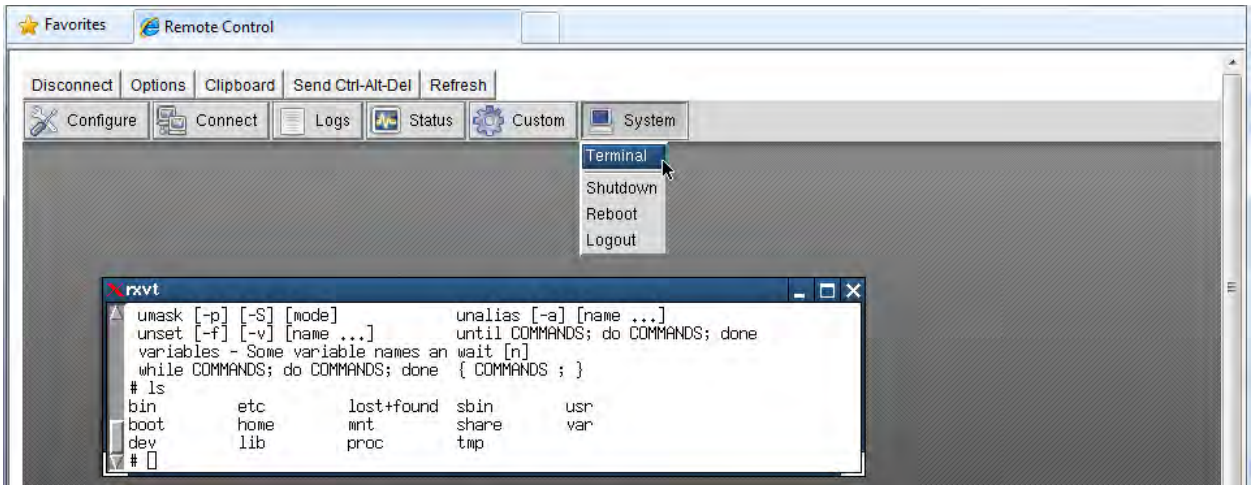
- Select Connect: PowerAlert on the control panel. The PowerAlert software will be launched.



16.2 Advanced Control Panel

16.2.1 System: Terminal

Selecting System: Terminal on the control panel logs you in at the command line to the B092-016 Linux kernel. As detailed in Chapters 14 and 15, this enables you to configure and customize your B092-016 using the config and portmanager commands or general Linux commands.



16.2.2 System: Shutdown / Reboot

Clicking System: Shutdown on the control panel will shut down the B092-016 system. You will need to cycle the power to reactivate the B092-016 with a soft reset.

Similarly, by clicking System: Reboot, you will initiate a soft reset. With a soft reset, the B092-016 reboots with all settings such as the assigned network IP address, preserved. However a soft reset disconnects all Users and ends any SSH sessions that had been established.

A soft reset will also occur when you switch OFF power from the B092-016, and then switch the power back ON. However, if you cycle the power while the unit is writing to flash, you could corrupt or lose data, so the software Shutdown or Reboot from the control panel is the safer option.

16.2.3 System: Logout

Clicking System: Logout closes the local user log in session (and removes the control panel). However, this does not logout remote users who may be logged into the B092-016 Console Server, or accessing attached devices using SSH tunneling.

16.2.4 Custom

The Custom button on the control panel enables you to customize your B092-016 by adding buttons to the control panel that execute bash and other Linux commands you specify.

16.2.5 Status

These menu items give the user a snapshot of the serial port and IPMI device status.

16.2.6 Logs

These menu items give the user an audit log of B092-016 activity.

16.3 Remote Control

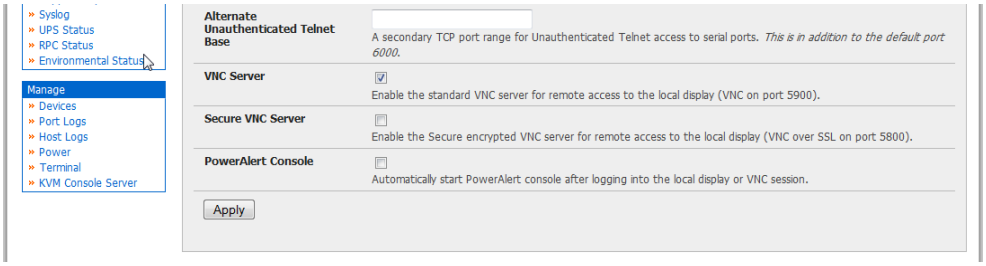
You can access the B092-016 locally via a directly connected keyboard, monitor and mouse (or KVM switch). If the B092-016 is connected to a KVMoIP infrastructure, then this may also provide you with some remote access to the B092-016 local consoles (RDP, Telnet, VNC, ICA, JRE etc).

The B092-016 also hosts an embedded VNC server that enables you to remotely monitor and control the thin client software (RDP, Telnet, VNC, ICA etc) that is running in the B092-016 itself.

Note You can still run management client software (RDP etc) on the remote computer and use SDT to securely connect the client directly to the managed devices that are serially or network attached to the B092-016. This is useful when running proprietary applications (such as Dell OpenManage) or Windows applications (such as VMware VDI client) on a remote management computer which is be used to manage a DRAC service processor or VMware virtual device on a remote server.

Each B092-016 gateway has an internal VNC server enabling remote administrators to oversee local activity, and giving them the option to access and control all the devices themselves. To activate the VNC server in the B092-016:

- Select the System: Services option in the Management Console menu then check VNC Server or Secure VNC Server.


» Syslog
» UPS Status
» RPC Status
» Environmental Status
Manage
» Devices
» Port Logs
» Host Logs
» Power
» Terminal
» KVM Console Server
Alternate Unauthenticated Telnet Base
A secondary TCP port range for Unauthenticated Telnet access to serial ports. This is in addition to the default port 6000.
VNC Server
Enable the standard VNC server for remote access to the local display (VNC on port 5900).
Secure VNC Server
Enable the Secure encrypted VNC server for remote access to the local display (VNC over SSL on port 5800).
PowerAlert Console
Automatically start PowerAlert console after logging into the local display or VNC session.
Apply

- Click Manage: KVM Console Server then Launch Standard VNC Remote Control and your browser will automatically download and run a Java VNC applet client.
- Log in as root (or some other configured B092-016 username) and as a remote Administrator you can then connect to the VNC server in the B092-016 and gain remote access to (and monitor and take control of) the B092-016 local display.

You can find more details on configuration options for the B092-016 realvnc server in: http://www.realvnc.com/products/free/4.1/man/vncserver.html

Note You can also run a VNC client application such as RealVNC, TightVNC or UltraVNC directly on a remote computer and configure it with the B092-016's IP address to connect to the B092-016 VNC server.

Appendix A Hardware Specification

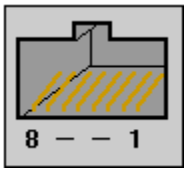
FEATURE	VALUE
Dimensions	B096-016 / B096-048: 17 x 12 x 1.75 in (43.2 x 31.3. x 4.5 cm) B092-016: 17 x 6.7 x 1.75 in (44 x 17 x 4.5 cm) B095-004 / B095-003: 4.1x3.4x1.1 in (10.3 x 8.7 x 2.8 cm)
Weight	B096-016 / B096-048: 11.8 lbs (5.4 kg) B092-016: 8.5 lb (3.9 kg) B095-004 / B095-003: 2.2 lbs (1.0 kg)
Ambient operating temperature	41°F to 122°F (5°C to 50°C)
Non-operating storage temperature	-20°F to +140°F (-30°C to +60°C)
Humidity	5% to 90%
Power	Refer to Chapter 2

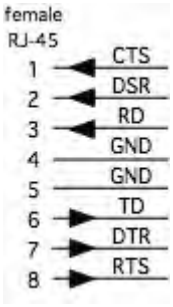
Appendix B Serial Port Connectivity

Pinout standards exist for both DB9 and DB25 connectors, however, there are not pinout standards for serial connectivity using RJ45 connectors. Many Console Servers and serially managed servers/ router/ switches/ PSUs have adopted their own unique pinout; so custom connectors and cables may be required to interconnect your Console Server. In an endeavor to create some move to standardization, Tripp Lite Console Server products all use the same RJ45 pinout convention as adopted by Cisco, SUN and others.

Serial Port Pinout

The 16/48 RJ45 connectors on the B092-016 Console Server with PowerAlert, and the B096-048/016 Console Server Management Switch have the following pinout:

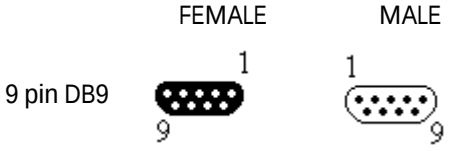




PIN	SIGNAL	DEFINITION	DIRECTION
1	CTS	Clear To Send	Input
2	DSR	Data Set Ready	Input
3	RXD	Receive Data	Input
4	GND	Signal Ground	NA
5	GND	Signal Ground	NA
6	TXD	Transmit Data	Output
7	DTR	Data Terminal Ready	Output
8	RTS	Request To Send	Output

The LOCAL (console/modem) port on the Console Server uses a standard DB9 connector as tabled below:

SIGNAL	DB9 Pin	DEFINITION
TXD	3	Transmitted Data
RXD	2	Received Data
RTS	7	Request To Send
CTS	8	Clear To Send
DSR	6	Data Set Ready
GND	5	Signal Ground
CD	1	Received Line Signal Detector
DTR	4	Data Terminal Ready
RI	9	Ring Indicator



Connectors Included in Console Server

The B092-016 Console Server with PowerAlert, and the B096-048/016 Console Server Management Switch ship with a “cross-over” and a “straight” RJ45-DB9 connector for connecting to other vendor’s products:

DB9F-RJ45S straight connector

WIRING TABLE

	DB9F		RJ45	
RTS	7	——	1	RTS
DSR	6	——	2	DSR
DCD	1	——	3	DCD
RXD	2	——	4	RXD
TXD	3	——	5	TXD
GND	5	——	6	GND
DTR	4	——	7	DTR
CTS	8	——	8	CTS
RI	9			

DB9F-RJ45S cross-over connector

WIRING TABLE

	DB9F		RJ45	
CTS	8	——	1	RTS
DTR	4	——	2	DSR
DTR	4	——	3	DCD
TXD	3	——	4	RXD
RXD	2	——	5	TXD
GND	5	——	6	GND
DSR	6	——	7	DTR
DCD	1	——	7	DTR
RTS	7	——	8	CTS
RI	9			

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Your Tripp Lite product is covered by the warranty described in this manual. A variety of Extended Warranty and On-Site Service Programs are also available from Tripp Lite. For more information on service, visit www.tripplite.com/support. Before returning your product for service, follow these steps:

1. Review the installation and operation procedures in this manual to insure that the service problem does not originate from a misreading of the instructions.

2. If the problem continues, do not contact or return the product to the dealer. Instead, visit www.tripplite.com/support.

3. If the problem requires service, visit www.tripplite.com/support and click the Product Returns link. From here you can request a Returned Material Authorization (RMA) number, which is required for service. This simple on-line form will ask for your unit's model and serial numbers, along with other general purchaser information. The RMA number, along with shipping instructions will be emailed to you. Any damages (direct, indirect, special or consequential) to the product incurred during shipment to Tripp Lite or an authorized Tripp Lite service center is not covered under warranty. Products shipped to Tripp Lite or an authorized Tripp Lite service center must have transportation charges prepaid. Mark the RMA number on the outside of the package. If the product is within its warranty period, enclose a copy of your sales receipt. Return the product for service using an insured carrier to the address given to you when you request the RMA.

Limited Warranty

Seller warrants this product, if used in accordance with all applicable instructions, to be free from original defects in material and workmanship for a period of 2 years (except U.S., Canada and Mexico: 1 year) from the date of initial purchase. If the product should prove defective in material or workmanship within that period, Seller will repair or replace the product, in its sole discretion. Service under this Warranty includes parts and Tripp Lite service center labor. On-site service plans are available from Tripp Lite through authorized service partners (in most areas). Visit www.tripplite.com/support for details. International customers should contact Tripp Lite support at intlservice@tripplite.com.

THIS WARRANTY DOES NOT APPLY TO NORMAL WEAR OR TO DAMAGE RESULTING FROM ACCIDENT, MISUSE, ABUSE OR NEGLECT. SELLER MAKES NO EXPRESS WARRANTIES OTHER THAN THE WARRANTY EXPRESSLY SET FORTH HEREIN. EXCEPT TO THE EXTENT PROHIBITED BY APPLICABLE LAW, ALL IMPLIED WARRANTIES, INCLUDING ALL WARRANTIES OF MERCHANTABILITY OR FITNESS, ARE LIMITED IN DURATION TO THE WARRANTY PERIOD SET FORTH ABOVE; AND THIS WARRANTY EXPRESSLY EXCLUDES ALL INCIDENTAL AND CONSEQUENTIAL DAMAGES.

(Some states do not allow limitations on how long an implied warranty lasts, and some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitations or exclusions may not apply to you. This Warranty gives you specific legal rights, and you may have other rights which vary from jurisdiction to jurisdiction).

Tripp Lite; 1111 W. 35th Street; Chicago IL 60609; USA

WARNING: The individual user should take care to determine prior to use whether this device is suitable, adequate or safe for the use intended. Since individual applications are subject to great variation, the manufacturer makes no representation or warranty as to the suitability or fitness of these devices for any specific application.

Warranty Registration

Visit www.tripplite.com/warranty today to register the warranty for your new Tripp Lite product. You'll be automatically entered into a drawing for a chance to win a FREE Tripp Lite product!*

* No purchase necessary. Void where prohibited. Some restrictions apply. See website for details.

WARNING!

Use of this equipment in life support applications where failure of this equipment can reasonably be expected to cause the failure of the life support equipment or to significantly affect its safety or effectiveness is not recommended. Do not use this equipment in the presence of a flammable anesthetic mixture with air, oxygen or nitrous oxide.

Regulatory Compliance Identification Numbers

For the purpose of regulatory compliance certifications and identification, your Tripp Lite product has been assigned a unique series number. The series number can be found on the product nameplate label, along with all required approval markings and information. When requesting compliance information for this product, always refer to the series number. The series number should not be confused with the marking name or model number of the product.

WEEE Compliance Information for Tripp Lite Customers and Recyclers (European Union)

Under the Waste Electrical and Electronic Equipment (WEEE) Directive and implementing regulations, when customers buy new electrical and electronic equipment from Tripp Lite they are entitled to:

- Send old equipment for recycling on a one-for-one, like-for-like basis (this varies depending on the country)
- Send the new equipment back for recycling when this ultimately becomes waste

Tripp Lite follows a policy of continuous improvement. Product specifications are subject to change without notice.

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